WATER SYSTEM HYDRAULIC MODELING REPORT

FOR

VICTORY HEIGHTS

WCE JOB NO. 22-3185

City of Spokane, Washington

August 25th, 2023

Prepared by:

Whipple Consulting Engineers, Inc
21 S. Pines Road
Spokane Valley, WA 99206
Ph 509-893-2617
F 509-926-0227

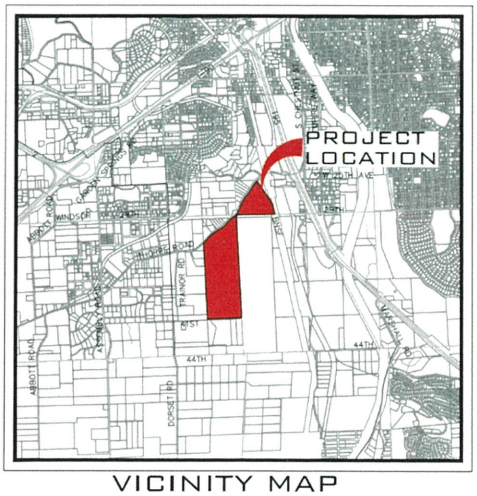
This report has been prepared by Ryan M. Andrade, P.E. of Whipple Consulting Engineers, Inc under the direction of the undersigned professional engineer whose seal and signature appear hereon.

Todd R. Whipple, P.E.

GENERAL

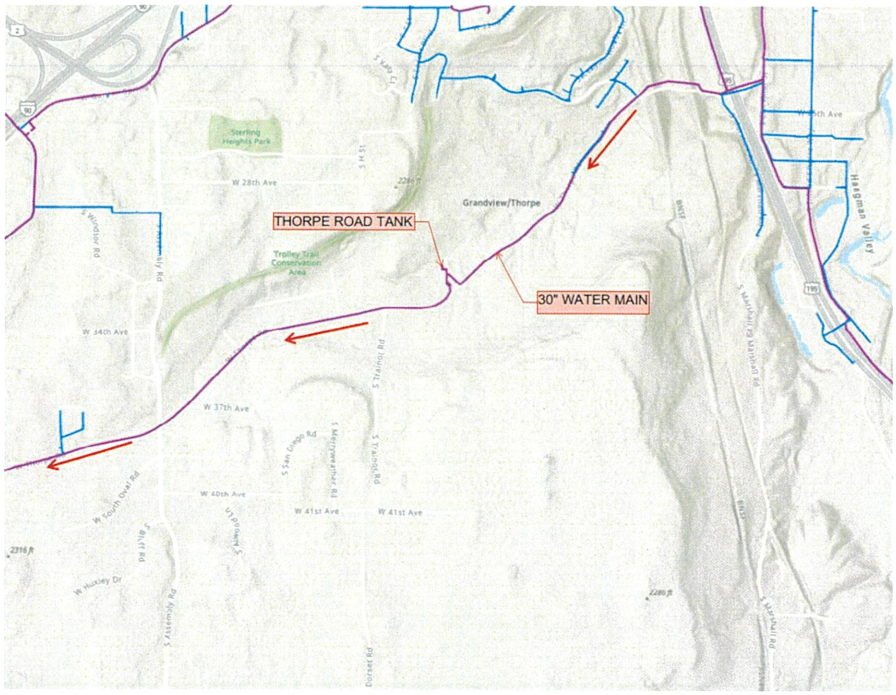
The Victory Heights proposed PUD & Subdivision lies south of West Thorpe Road, west of the BNSF railway and US 195, east of South Trainor Road, and north of W 47th Avenue. Victory Heights is a proposed 1,003 lot single family subdivision on approximately 177.27 Ac. The address is 2929 W Thorpe Road. All roads are local roads. Victory Heights lies in the SW ¼ of Section 25 and NE & SE ¼ of Section 35, T. 25 N., R. 42 E., W.M. in Spokane, WA. See Figure 1 Vicinity Map below.

Figure 1 – Vicinity Map



Utilities for this subdivision are served by the City of Spokane. The proposed water system is expected to be public & owned and operated by the City of Spokane upon completion & certification. The subdivision will be serviced off of an existing 30" water main that runs within Thorpe Road running west from US 195 into the Thorpe Road water tank and then back out and continuing west past Assembly Road and eventually into the SIA water tanks located adjacent to Spokane International Airport. See Figure 2 below.

Figure 2 – COS Water GIS Map



The hydraulic analysis is based on the existing 30" water main in Thorpe Road. There will be four (4) connections from the project to the existing water main. See Figure 3 below.

Figure 3 – Proposed Connections

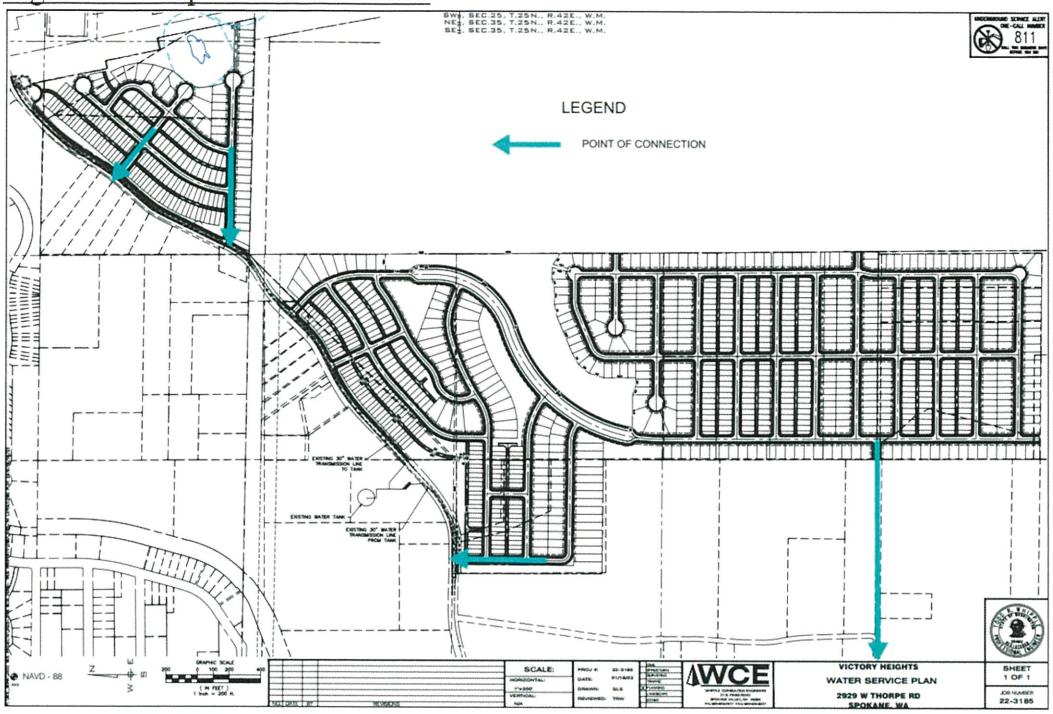
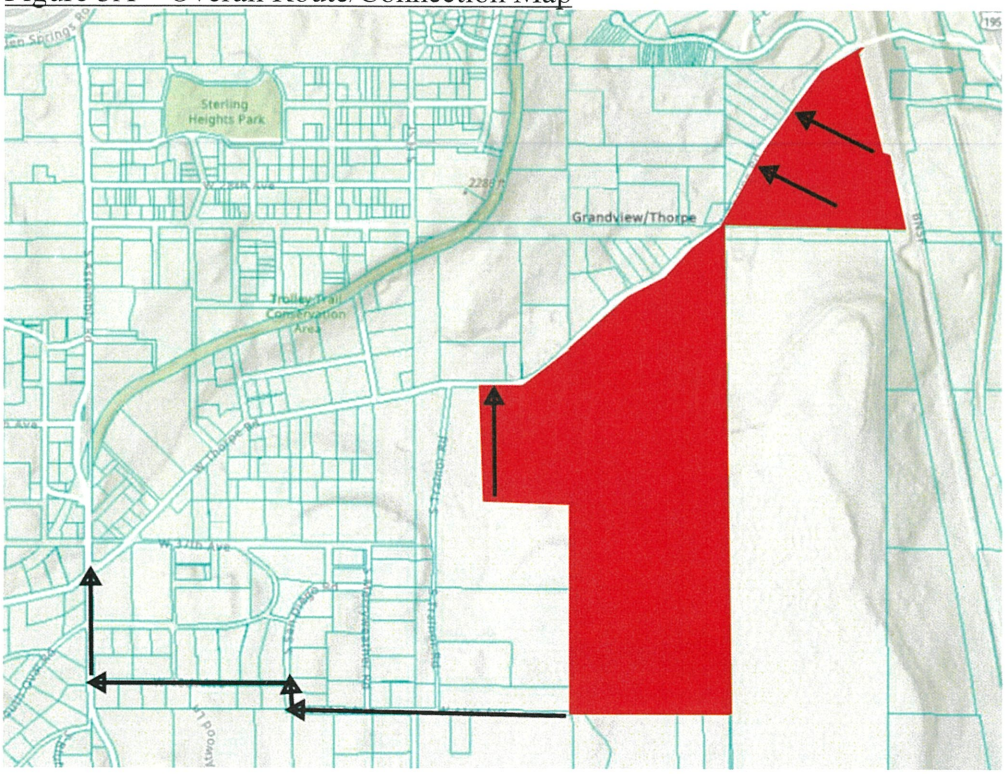


Figure 3A – Overall Route/Connection Map



Pressure Zones:

Due to topography this project will be served by multiple pressure zones. The NE connection point, which will serve the NE triangle shaped parcel will be served by the Thorpe Road tank (T-1) that sits at an elevation of 2046.70. *(Note: ("X") references are from the water model in the Appendix)* This portion of the site will be referred to as the "Low Zone". The remaining portion of the project will be served by the SIA tanks (T-2) that sits at an elevation of 2452.70. This SIA served portion of the project will have two (2) zones, "PRV Mid Zone" and "High Zone".

The Victory Heights Subdivision building pad elevations will range between NAVD 88 Elevations 2285 (at the far south end) to 1913 (at the far north end).

It is apparent from this analysis, that all elevations within the "Low Zone" of the subdivision are within the service range of the Thorpe Road Tank, and that all elevations within the "PRV Mid Zone" and "High Zone" are within the service range of the SIA Tanks. See Figures 4 & 5 below.

Figure 4 –System Elevation Map

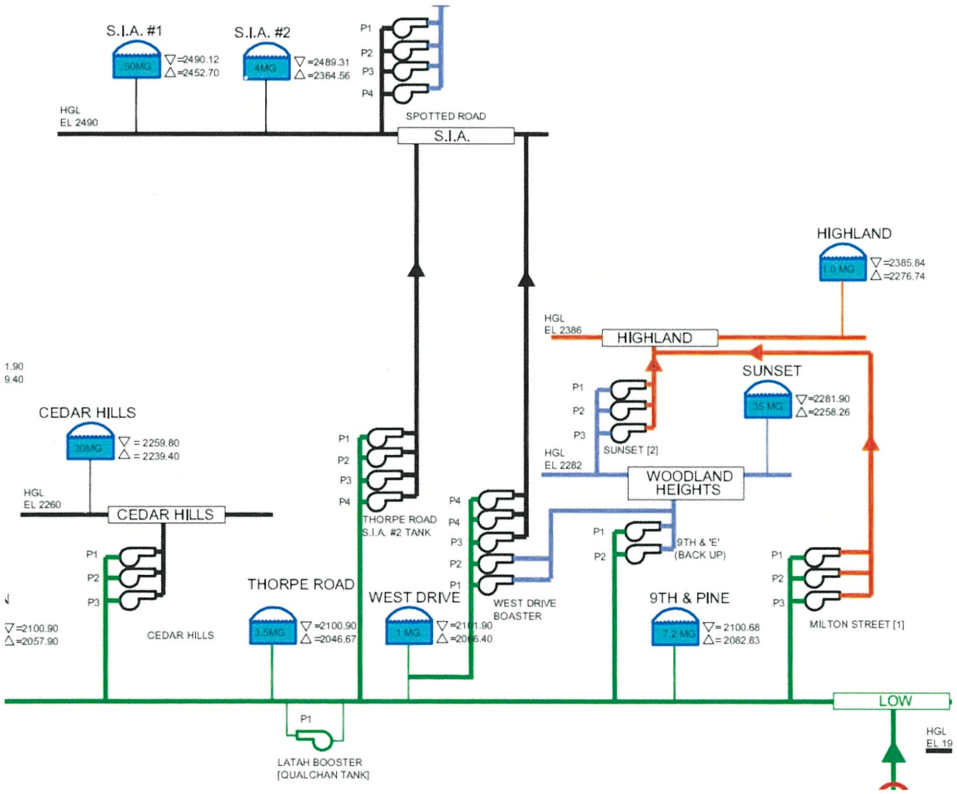
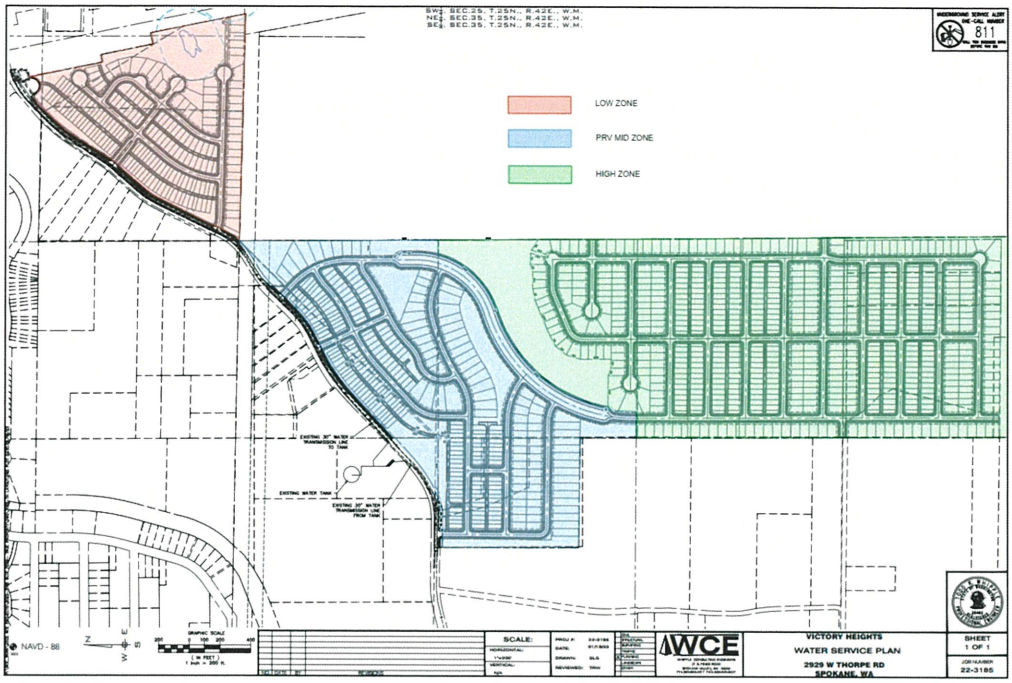


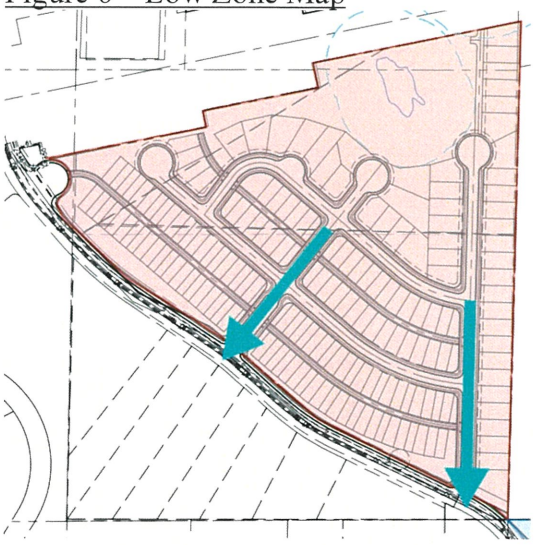
Figure 5 – Proposed Zone Map



LOW ZONE

The "Low Zone", which is made up of approximately 170 single family lots located in the northern section of the project, will utilize a looped water system with its two (2) connections to the existing system at the proposed roads Carthage & Elissa Streets. As mentioned earlier, this "Low Zone" is served by the existing Thorpe Road tank. This zone can anticipate pressures ranging from around 47 psi to 80 psi. In a non-fire flow scenario, this zone would not anticipate the need for any individual pressure reducing valves (PRVs) or booster pumps. See Figure 6, below.

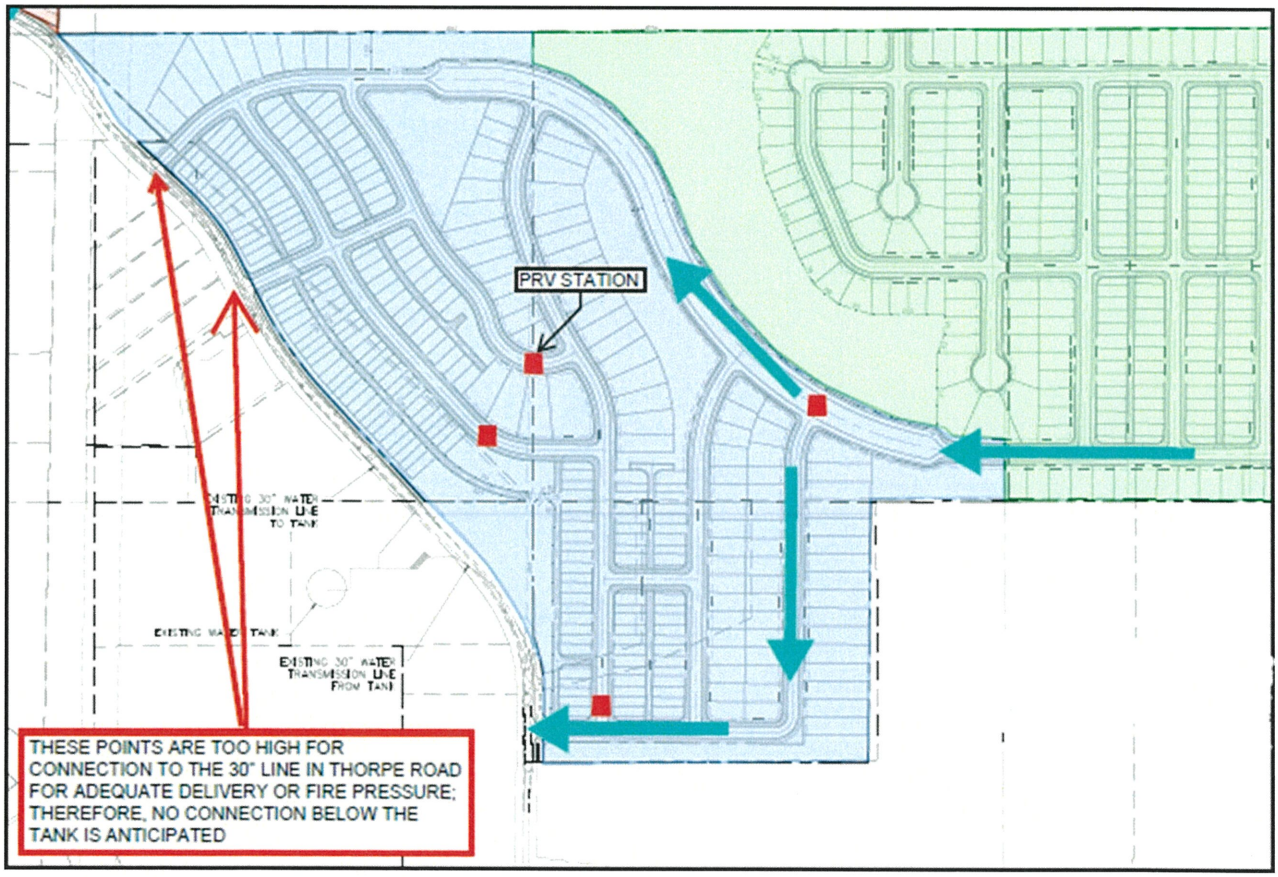
Figure 6 – Low Zone Map



PRV MID ZONE

The "PRV Mid Zone", which is made up of approximately 267 single family lots located mostly in the center of the project, will utilize a looped water system with its two (2) connections to the existing & proposed system at the proposed roads Utica Street & Tunis Drive. The connection that runs down Utica Street then east down 35th Avenue will run parallel to the 12" water main for the "High Zone". As mentioned earlier, this "PRV Mid Zone" is served by the existing SIA tanks. This zone can anticipate pressures ranging from around 45 psi to 80 psi. In a non-fire flow scenario, due to SIA pressures of 167 psi approximately, this zone anticipates the need for four (4) pressure reducing valve (PRV) stations to maintain acceptable pressures throughout. See below figure illustrating the proposed locations of the four (4) PRV stations, as well as the connection points to the existing and proposed systems.

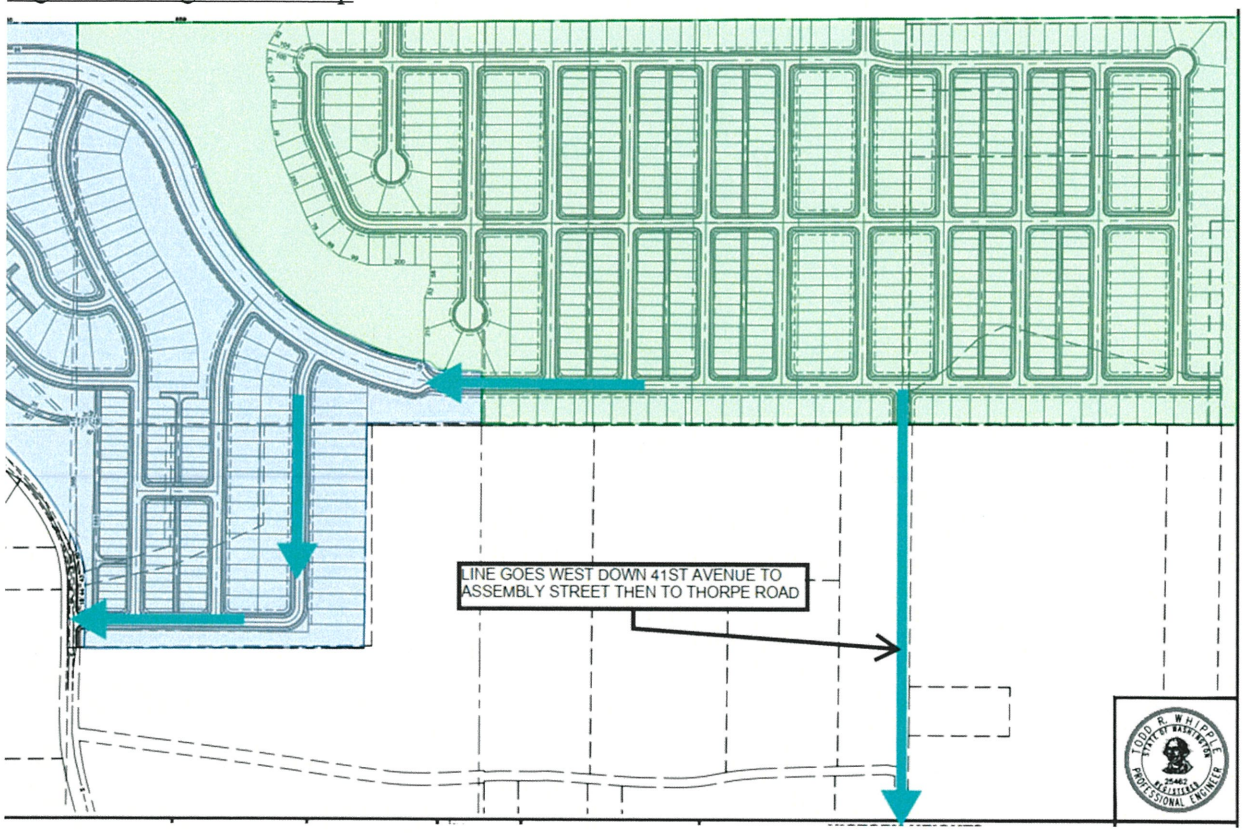
Figure 7 – PRV Mid Zone Map



HIGH ZONE

The "High Zone", which is made up of approximately 566 single family lots located mostly in the south end of the project, will utilize a looped water system with its two (2) connections to the existing & proposed system at the proposed roads Tunis Drive and 41st Avenue. The connection that runs from Tunis Drive turns west at 35th Avenue then north at Utica Street and will run parallel to the pressure reduced 8" water main for the "PRV Mid Zone". The connection that runs from 41st Avenue will go down the ROW of 41st Avenue, turn north on San Diego Road, then west on 40th Avenue until reaching Assembly Road. Then continuing north along Assembly Road until final connection into the existing water main within Thorpe Road. As mentioned earlier, this "High Zone" is also served by the existing SIA tanks. This zone can anticipate pressures ranging from around 86 psi to 100 psi. In a non-fire flow scenario, this zone anticipates the need for individual pressure reducing valves (PRVs) to be installed in all lots to maintain acceptable pressures throughout per City design guidelines. See Figure 8, below.

Figure 8 – High Zone Map



ANALYSIS SUMMARY

The purpose of this report is to analyze the static & dynamic water pressures of the water system for the site to determine the appropriate operating pressures and ensure fire flow & service pressure requirements are met. The site has been analyzed assuming various demands and patterns based on residential use as noted. As required per City of Spokane standards, the site was modeled for the

Max Day Demand (MDD) for residential uses and then subsequent fire flow scenarios were evaluated. The proposed project that is described below was determined through a series of different options, balancing installation and operating costs, availability of utility services, and meeting the requirements of the City of Spokane to make this project function & operate in conjunction with the City of Spokane standards and specifications.

This project has been modeled considering all three (3) zones (Low, PRV Mid, & High) and was run several times to ensure that various operating conditions have been analyzed. Table 1 below illustrates the Max Day Demand (MDD) domestic flow rates anticipated for each zone.

Table 1 – Demand Rates by Zone

Zone	Max Day Demand (MDD) Flow Rate (gpm)
Low	200
PRV Mid	315
High	667

- System Check – No Flow. The demand on the system was set to zero and this is for reference only.
- Max Day Demand (MDD) Operation – MDD with no fire flow per Equivalent Dwelling Unit (EDU) demands. The MDD/EDU flow rate was analyzed. In this scenario, the Low Zone will not require any methods for boosting or reducing pressure as the pressure ranges from 47 to 80 psi without fire. The PRV Mid Zone will require four (4) separate pressure reducing valve (PRV) stations within the zone located near junctions J-3e, J-36, J-40, and J-30. See Junction Node Map in the Appendix. These PRV stations will allow flows to stay within acceptable ranges throughout the zone from 45 to 80 psi without fire. The High Zone will require the presence of an individual PRV within most EDUs within the zone as the pressures ranges are relatively high from 86 to 100 psi without fire.
- MDD with Fire Flow at junction J-3. A fire flow rate of 1,500-gpm, plus the MDD flow rate of 34-gpm, was applied to J-3 (farthest junction away from the PRV Mid & High Zones connection to the existing 30" main within Thorpe Road). In this scenario, the Low Zone again would not require any methods for boosting or reducing pressure as the pressure ranges from 47 to 80 psi. The PRV Mid Zone will still require four (4) separate PRV stations within the zone located near junctions J-3e, J-36, J-40, and J-30. These PRV stations will continue to allow flows to be within acceptable ranges throughout the zone from 45 to 66 psi, except for at junction J-33. This junction would fall just below the 45 psi threshold for domestic demand, but is above the 20 psi threshold for fire flow. The High Zone would not require the presence of any individual PRVs within the EDUs within the zone as the pressures ranges from 83 to 97 psi.
- MDD with Fire Flow at junction J-3f. A fire flow rate of 1,500-gpm, plus the MDD flow rate of 18-gpm, was applied to J-3f (farthest junction away from the Low Zone connection to the existing 30" main within Thorpe Road). In this scenario, the Low Zone again would not require any methods for boosting or reducing pressure as the pressure ranges from 47 to

79 psi except for at junction J-3f. This junction would fall below the 45 psi threshold for domestic demand, but is above the 20 psi threshold for fire flow. The PRV Mid Zone will still require four (4) separate PRV stations within the zone located near junctions J-3e, J-36, J-40, and J-30. These PRV stations will continue to allow flows to be within acceptable ranges throughout the zone from 45 to 80 psi approximately. The High Zone will again require the presence of an individual PRV within most EDUs within the zone as the pressures range relatively high from 86 to 100 psi approximately.

These four (4) different scenarios represent the system under the various operating conditions and show what the pressures are available for Max Day Demand with & without fire flows. Table 2 below provides a summary of the minimum and maximum pressures calculated within each zone.

Table 2 – Analysis Calculation Summary

Analysis Scenario	Total System Domestic Flow (gpm)	Total System Fire Flow (gpm)	Minimum Pressure (psi)	Maximum Pressure (psi)	Zone
MDD Operation	200	0	47.2	80.5	Low
	315	0	45.6	80.0	PRV Mid
	667	0	86.4	100.7	High
MDD + Fire Flow @ J-3	200	0	47.2	80.5	Low
	315	1,500	42.1	66.0	PRV Mid
	667	0	82.8	97.0	High
MDD + Fire Flow @ J-3f	200	1,500	35.8	78.8	Low
	315	0	45.6	80.0	PRV Mid
	667	0	86.4	100.7	High

CONCLUSION

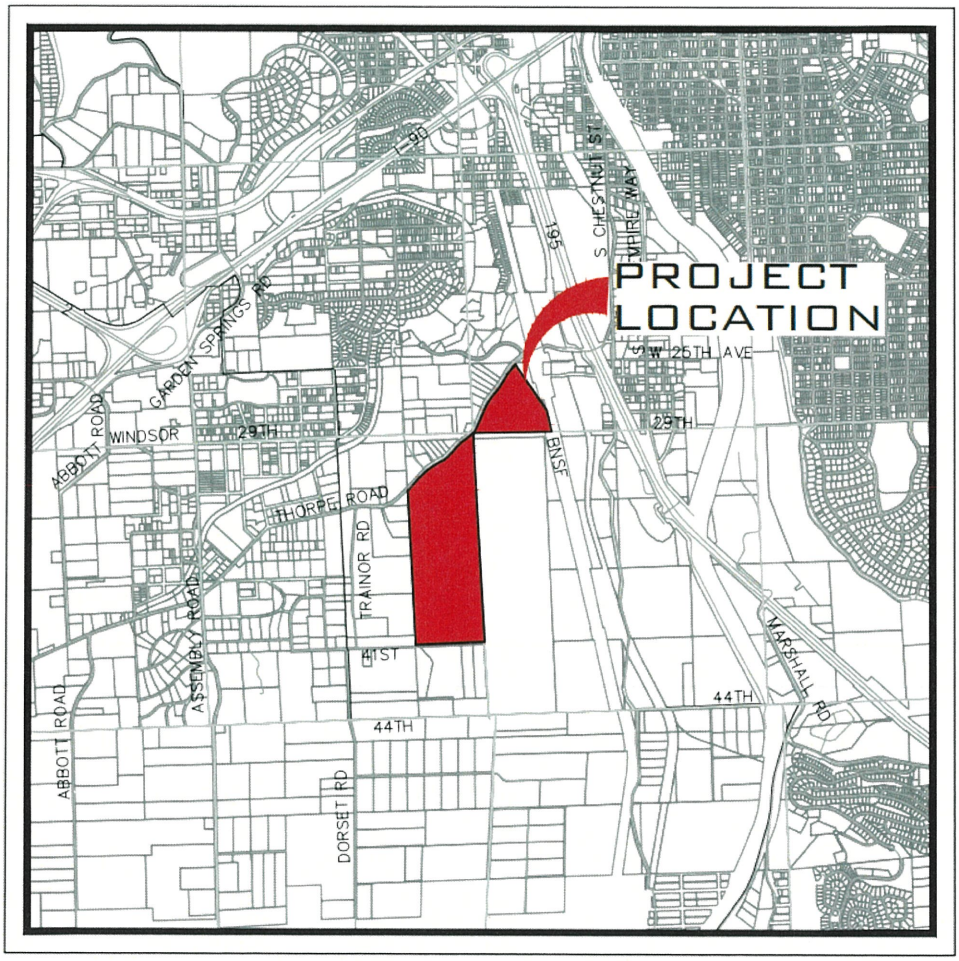
This analysis and report demonstrate that indeed all three (3) operating zones will meet the required pressure & flow requirements, with necessary PRV stations and individual PRVs within EDUs, in operating conditions for domestic & fire flow demands.

See attached exhibits and individual calculation narratives for more information.

KYPipe 2020 ANALYSIS REPORT

Appendix Table of Contents

1. Vicinity Map



VICINITY MAP

2. Junction and Node Map

T-1a
J-2
J-3j
J-3k
J-3o
J-3p
J-3q
J-3n
J-3f
J-3i
J-3h
J-3b
J-3
J-42
J-32
J-4
J-40
RV-2
RV-3
J-36
J-33
J-39
AV-1
T-1
J-37
J-35
J-34
J-41
J-38b
J-16
J-8
J-7
J-11
J-12
J-15
J-20
J-23
J-24
J-26
J-28
J-17
J-18
J-19
J-45
J-9
J-10
J-13
J-14
J-21
J-22
J-25
J-27
J-29
J-38a
J-1
T-2

3. MDD Analysis Calculations by Zone

WCE
WHIPPLE CONSULTING ENGINEERS

CITY OF SPOKANE WATER
PRELIMINARY USE CALCULATIONS

PROJECT 22-3185
NAME Victory Heights
DATE 8/24/2023

LOW ZONE

ENGR RMA

CITY WATER ANTICIPATED USE CALCULATIONS ADD/MDD/PHD
GALLONS PER DAY (GPD)

# OF UNITS		170.0	
		261.0	GALLONS PER CAPITA PER DAY
		2.5	CAPITA PER UNIT
		110,925.0	AVERAGE DAILY DEMAND (GPD) (ADD)
		2.6	FACTOR FOR MAXIMUM DAILY DEMAND (GPD)(MDD)
		288,405.0	MAXIMUM DAY DEMAND (GPD)(MDD)
		1.7	FACTOR FOR PEAK HOUR DEMAND (GPD)(PHD)
		490,288.5	PEAK HOUR DEMAND (GPD)(PHD)

CITY WATER ANTICIPATED USE CALCULATIONS ADD/MDD/PHD
GALLONS PER MINUTE (GPM) NOTE 1440= 24HR/DAY X 60MIN/HR

ADD	77	GPM
MDD	200	GPM
PHD	340	GPM

WHIPPLE CONSULTING ENGINEERS

CITY OF SPOKANE WATER
PRELIMINARY USE CALCULATIONS

PROJECT 22-3185
NAME Victory Heights
DATE 8/24/2023

PRV MID ZONE

ENGR RMA

CITY WATER ANTICIPATED USE CALCULATIONS ADD/MDD/PHD
GALLONS PER DAY (GPD)

# OF UNITS	267.0	
	261.0	GALLONS PER CAPITA PER DAY
	2.5	CAPITA PER UNIT
	174,217.5	AVERAGE DAILY DEMAND (GPD) (ADD)
	2.6	FACTOR FOR MAXIMUM DAILY DEMAND (GPD)(MDD)
	452,965.5	MAXIMUM DAY DEMAND (GPD)(MDD)
	1.7	FACTOR FOR PEAK HOUR DEMAND (GPD)(PHD)
	770,041.4	PEAK HOUR DEMAND (GPD)(PHD)

CITY WATER ANTICIPATED USE CALCULATIONS ADD/MDD/PHD
GALLONS PER MINUTE (GPM) NOTE 1440= 24HR/DAY X 60MIN/HR

ADD	121	GPM
MDD	315	GPM
PHD	535	GPM

WHIPPLE CONSULTING ENGINEERS

CITY OF SPOKANE WATER
PRELIMINARY USE CALCULATIONS

PROJECT 22-3185
NAME Victory Heights
DATE 8/24/2023

HIGH ZONE

ENGR RMA

CITY WATER ANTICIPATED USE CALCULATIONS ADD/MDD/PHD
GALLONS PER DAY (GPD)

# OF UNITS	566.0		
	261.0	GALLONS PER CAPITA PER DAY	
	2.5	CAPITA PER UNIT	
	369,315.0	AVERAGE DAILY DEMAND (GPD) (ADD)	
	2.6	FACTOR FOR MAXIMUM DAILY DEMAND (GPD)(MDD)	
	960,219.0	MAXIMUM DAY DEMAND (GPD)(MDD)	
	1.7	FACTOR FOR PEAK HOUR DEMAND (GPD)(PHD)	
	1,632,372.3	PEAK HOUR DEMAND (GPD)(PHD)	

CITY WATER ANTICIPATED USE CALCULATIONS ADD/MDD/PHD
GALLONS PER MINUTE (GPM) NOTE 1440= 24HR/DAY X 60MIN/HR

ADD	256	GPM
MDD	667	GPM
PHD	1,134	GPM

4. MDD Operation with No Fire Flow Analysis Report

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*                                                           *
*  Pipe Network Modeling Software                           *
*                                                           *
*  CopyRighted by KYPIPE LLC (www.kypipe.com)               *
*  Version: 10.009  10/01/2019                              *
*  Serial #:  8-10075658                                    *
*  Interface:  KYnetic                                      *
*  Licensed for Pipe2020                                    *
*                                                           *
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Date & Time: Thu Aug 24 17:24:53 2023

Master File : p:\wce_work\2022 wce projects\2022-3185 blue fern- true property\documents\water model\3185 water model.KYP\3185 water model.P2K

SUMMARY OF ORIGINAL DATA

UNITS SPECIFIED

FLOWRATE ..... = gallons/minute
HEAD (HGL) ..... = feet
PRESSURE ..... = psig

R E G U L A T I N G V A L V E D A T A

VALVE LABEL	VALVE TYPE	VALVE SETTING (ft or gpm)
RV-1	PRV-2	2271.46
RV-2	PRV-1	2202.85
RV-3	PRV-1	2183.62
RV-4	PRV-1	2237.85

P I P E L I N E D A T A

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NAMES #1	#2	LENGTH (ft)	DIAMETER (in)	ROUGHNESS COEFF.	MINOR LOSS COEFF.
P-1	T-1a	J-2	200.00	30.00	130.0000	0.00
P-2	J-2	J-3g	760.00	30.00	130.0000	0.00
P-3	J-3c	J-3b	625.00	30.00	130.0000	0.00
P-4	J-3c	J-3d	420.00	30.00	130.0000	0.00
P-5	J-3d	J-39	780.00	30.00	130.0000	0.00
P-6	J-3e	J-38	46.00	30.00	130.0000	0.00
P-7	J-3b	J-3h	350.00	8.00	130.0000	0.00
P-8	J-3g	J-3b	810.00	30.00	130.0000	0.00
P-9	J-3h	J-3i	250.00	8.00	130.0000	0.00
P-10	J-3i	J-3f	440.00	8.00	130.0000	0.00
P-11	J-3h	J-3l	640.00	8.00	130.0000	0.00
P-12	J-3i	J-3m	475.00	8.00	130.0000	0.00
P-13	J-3k	J-3j	215.00	8.00	130.0000	0.00
P-14	J-3l	J-3k	320.00	8.00	130.0000	0.00
P-15	J-3g	J-3l	275.00	8.00	130.0000	0.00
P-16	J-3m	J-3o	320.00	8.00	130.0000	0.00
P-17	J-3l	J-3m	250.00	8.00	130.0000	0.00
P-18	J-3m	J-3n	180.00	8.00	130.0000	0.00

P-19	J-4	I-RV-3	765.00	8.00	130.0000	0.00
P-20	J-3	J-5	290.00	8.00	130.0000	0.00
P-21	J-4	J-42	250.00	8.00	130.0000	0.00
P-22	J-3	J-4	500.00	8.00	130.0000	0.00
P-23	J-3e	I-RV-4	93.00	8.00	130.0000	0.00
P-24	J-6	J-38a	2245.40	12.00	130.0000	0.00
P-25	J-6	J-22	125.00	8.00	130.0000	0.00
P-26	J-8	J-16	250.00	8.00	130.0000	0.00
P-27	J-7	J-8	250.00	8.00	130.0000	0.00
P-28	J-9	J-10	250.00	12.00	130.0000	0.00
P-29	J-7	J-9	1040.00	8.00	130.0000	0.00
P-30	J-10	J-13	250.00	12.00	130.0000	0.00
P-31	J-11	J-7	250.00	8.00	130.0000	0.00
P-32	J-10	J-11	1040.00	8.00	130.0000	0.00
P-33	J-12	J-11	250.00	8.00	130.0000	0.00
P-34	J-13	J-14	250.00	12.00	130.0000	0.00
P-35	J-12	J-13	1040.00	8.00	130.0000	0.00
P-36	J-14	J-21	250.00	12.00	130.0000	0.00
P-37	J-15	J-12	250.00	8.00	130.0000	0.00
P-38	J-14	J-15	1040.00	8.00	130.0000	0.00
P-39	J-16	J-38b	254.77	8.00	130.0000	0.00
P-40	J-16	J-17	375.00	8.00	130.0000	0.00
P-41	J-18	J-8	530.00	8.00	130.0000	0.00
P-42	J-18	J-19	300.00	8.00	130.0000	0.00
P-43	J-20	J-15	250.00	8.00	130.0000	0.00
P-44	J-21	J-6	125.00	12.00	130.0000	0.00
P-45	J-20	J-21	1040.00	8.00	130.0000	0.00
P-46	J-22	J-25	250.00	8.00	130.0000	0.00
P-47	J-23	J-20	250.00	8.00	130.0000	0.00
P-48	J-22	J-23	1040.00	8.00	130.0000	0.00
P-49	J-24	J-23	250.00	8.00	130.0000	0.00
P-50	J-25	J-27	250.00	8.00	130.0000	0.00
P-51	J-24	J-25	1040.00	8.00	130.0000	0.00
P-52	J-26	J-24	250.00	8.00	130.0000	0.00
P-53	J-27	J-29	250.00	8.00	130.0000	0.00
P-54	J-26	J-27	1040.00	8.00	130.0000	0.00
P-55	J-28	J-26	250.00	8.00	130.0000	0.00
P-56	J-29	J-28	1040.00	8.00	130.0000	0.00

P-57	J-30	O-RV-1	28.00	8.00	130.0000	0.00
P-58	J-30	J-33	270.00	8.00	130.0000	0.00
P-59	J-31	J-35	260.00	8.00	130.0000	0.00
P-60	J-31	J-36	775.00	8.00	130.0000	0.00
P-61	J-33	J-32	920.00	8.00	130.0000	0.00
P-62	J-33	J-35	1055.00	8.00	130.0000	0.00
P-63	J-35	J-34	270.00	8.00	130.0000	0.00
P-64	J-34	J-30	880.00	8.00	130.0000	0.00
P-65	J-36	J-40	280.00	8.00	130.0000	0.00
P-66	J-38a	J-1	2829.60	12.00	130.0000	0.00
P-67	J-3e	I-AV-1	550.00	30.00	130.0000	0.00
P-68	O-AV-1	J-39	150.00	30.00	130.0000	0.00
P-69	J-39	T-1	320.00	30.00	130.0000	0.00
P-70	J-40	J-32	745.00	8.00	130.0000	0.00
P-71	J-40	I-RV-2	143.00	8.00	130.0000	0.00
P-72	J-38b	J-18	915.23	8.00	130.0000	0.00
P-73	J-1	T-2	510.00	30.00	130.0000	0.00
P-74	J-37	J-4	260.00	8.00	130.0000	0.00
P-75	J-42	J-3	750.00	8.00	130.0000	0.00
P-76	J-45	J-9	415.00	12.00	130.0000	0.00
P-77	O-RV-2	J-42	547.00	8.00	130.0000	0.00
P-78	O-RV-3	J-36	305.00	8.00	130.0000	0.00
P-79	O-RV-4	J-31	107.00	8.00	130.0000	0.00
P-80	J-38	J-1	3814.00	30.00	130.0000	0.00
P-81	J-38	J-41	740.00	12.00	130.0000	0.00
P-82	J-43	J-45	288.00	12.00	130.0000	0.00
P-83	J-43	J-41	890.00	12.00	130.0000	0.00
P-84	I-RV-1	J-43	38.00	12.00	130.0000	0.00

N O D E D A T A

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	JUNCTION ELEVATION (ft)	EXTERNAL GRADE (ft)
I-AV-1		0.00	2065.00	
J-1		0.00	2226.00	
J-2		0.00	1911.00	
J-3		34.00	2033.00	
J-4		38.00	2048.00	
J-5		11.00	2018.00	
J-6		0.00	2276.00	
J-7		35.00	2265.00	
J-8		18.00	2262.00	
J-9		35.00	2258.00	
J-10		35.00	2269.00	
J-11		35.00	2268.00	
J-12		35.00	2270.00	
J-13		35.00	2271.00	
J-14		35.00	2273.00	
J-15		35.00	2272.00	
J-16		29.00	2259.00	
J-17		12.00	2255.00	
J-18		29.00	2258.00	
J-19		11.00	2252.00	
J-20		35.00	2274.00	
J-21		35.00	2275.00	
J-22		35.00	2279.00	
J-23		35.00	2276.00	
J-24		35.00	2278.00	
J-25		35.00	2281.00	
J-26		35.00	2280.00	
J-27		35.00	2283.00	
J-28		35.00	2282.00	
J-29		35.00	2285.00	
J-30		20.00	2192.00	

J-31	54.00	2108.00	
J-32	18.00	2099.00	
J-33	23.00	2166.00	
J-34	22.00	2149.00	
J-35	24.00	2129.00	
J-36	40.00	2109.00	
J-37	20.00	2032.00	
J-38	0.00	2100.00	
J-39	0.00	2052.00	
J-40	19.00	2104.00	
J-41	0.00	2149.00	
J-42	16.00	2065.00	
J-43	0.00	2195.00	
J-45	0.00	2223.00	
J-38a	0.00	2265.00	
J-38b	0.00	2256.00	
J-3b	0.00	1981.00	
J-3c	0.00	2018.00	
J-3d	0.00	2032.00	
J-3e	0.00	2100.00	
J-3f	18.00	1990.00	
J-3g	0.00	1933.00	
J-3h	42.00	1979.00	
J-3i	19.00	1982.00	
J-3j	29.00	1913.00	
J-3k	22.00	1925.00	
J-3l	54.00	1943.00	
J-3m	13.00	1958.00	
J-3n	11.00	1971.00	
J-3o	11.00	1937.00	
I-RV-1	0.00	2193.00	
I-RV-2	0.00	2099.00	
I-RV-3	0.00	2089.00	
O-RV-4	----	2104.00	2237.85
T-1	----	2046.70	2099.00
T-2	----	2452.70	2487.00
T-1a	----	2046.70	2099.00
O-AV-1	0.00	2065.00	

O-RV-1	----	2193.00	2271.46
O-RV-2	----	2099.00	2202.85
O-RV-3	----	2089.00	2183.62
I-RV-4	0.00	2104.00	

O U T P U T O P T I O N D A T A

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT

MAXIMUM AND MINIMUM PRESSURES	=	5
MAXIMUM AND MINIMUM VELOCITIES	=	5
MAXIMUM AND MINIMUM HEAD LOSS/1000	=	5

S Y S T E M C O N F I G U R A T I O N

NUMBER OF PIPES .....(P)	=	84
NUMBER OF END NODES .....(J)	=	65
NUMBER OF PRIMARY LOOPS .....(L)	=	16
NUMBER OF SUPPLY NODES .....(F)	=	4
NUMBER OF SUPPLY ZONES .....(Z)	=	1

==========

Case: 0

RESULTS OBTAINED AFTER 23 TRIALS: ACCURACY = 0.95383E-04

S I M U L A T I O N D E S C R I P T I O N (L A B E L)

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	T-1a	J-2	132.59	0.00	0.00	0.06	0.00	0.00
P-2	J-2	J-3g	132.59	0.00	0.00	0.06	0.00	0.00
P-3	J-3c	J-3b	86.41	0.00	0.00	0.04	0.00	0.00
P-4	J-3c	J-3d	-86.41	0.00	0.00	0.04	0.00	0.00
P-5	J-3d	J-39	-86.41	0.00	0.00	0.04	0.00	0.00
P-6	J-3e	J-38	0.00	0.00	0.00	0.00	0.00	0.00
P-7	J-3b	J-3h	100.48	0.09	0.00	0.64	0.26	0.26
P-8	J-3g	J-3b	14.07	0.00	0.00	0.01	0.00	0.00
P-9	J-3h	J-3i	41.66	0.01	0.00	0.27	0.05	0.05
P-10	J-3i	J-3f	18.00	0.00	0.00	0.11	0.01	0.01
P-11	J-3h	J-3l	16.82	0.01	0.00	0.11	0.01	0.01
P-12	J-3i	J-3m	4.66	0.00	0.00	0.03	0.00	0.00
P-13	J-3k	J-3j	29.00	0.01	0.00	0.19	0.03	0.03
P-14	J-3l	J-3k	51.00	0.02	0.00	0.33	0.07	0.07
P-15	J-3g	J-3l	118.52	0.10	0.00	0.76	0.35	0.35
P-16	J-3m	J-3o	11.00	0.00	0.00	0.07	0.00	0.00
P-17	J-3l	J-3m	30.34	0.01	0.00	0.19	0.03	0.03
P-18	J-3m	J-3n	11.00	0.00	0.00	0.07	0.00	0.00
P-19	J-4	I-RV-3	0.00	0.00	0.00	0.00	0.00	0.00
P-20	J-3	J-5	11.00	0.00	0.00	0.07	0.00	0.00
P-21	J-4	J-42	-65.85	0.03	0.00	0.42	0.12	0.12
P-22	J-3	J-4	-7.85	0.00	0.00	0.05	0.00	0.00
P-23	J-3e	I-RV-4	0.00	0.00	0.00	0.00	0.00	0.00
P-24	J-6	J-38a	-394.83	1.02	0.00	1.12	0.45	0.45
P-25	J-6	J-22	206.71	0.12	0.00	1.32	0.99	0.99
P-26	J-8	J-16	47.45	0.02	0.00	0.30	0.06	0.06
P-27	J-7	J-8	99.00	0.06	0.00	0.63	0.25	0.25
P-28	J-9	J-10	216.76	0.04	0.00	0.61	0.15	0.15
P-29	J-7	J-9	-82.41	0.19	0.00	0.53	0.18	0.18
P-30	J-10	J-13	113.84	0.01	0.00	0.32	0.05	0.05

P-31	J-11	J-7	51.59	0.02	0.00	0.33	0.08	0.08
P-32	J-10	J-11	67.92	0.13	0.00	0.43	0.13	0.13
P-33	J-12	J-11	18.67	0.00	0.00	0.12	0.01	0.01
P-34	J-13	J-14	15.01	0.00	0.00	0.04	0.00	0.00
P-35	J-12	J-13	-63.83	0.12	0.00	0.41	0.11	0.11
P-36	J-14	J-21	-84.01	0.01	0.00	0.24	0.03	0.03
P-37	J-15	J-12	-10.16	0.00	0.00	0.06	0.00	0.00
P-38	J-14	J-15	64.02	0.12	0.00	0.41	0.11	0.11
P-39	J-16	J-38b	6.45	0.00	0.00	0.04	0.00	0.00
P-40	J-16	J-17	12.00	0.00	0.00	0.08	0.01	0.01
P-41	J-18	J-8	-33.55	0.02	0.00	0.21	0.03	0.03
P-42	J-18	J-19	11.00	0.00	0.00	0.07	0.00	0.00
P-43	J-20	J-15	-39.18	0.01	0.00	0.25	0.05	0.05
P-44	J-21	J-6	-188.12	0.01	0.00	0.53	0.11	0.11
P-45	J-20	J-21	-69.11	0.13	0.00	0.44	0.13	0.13
P-46	J-22	J-25	126.26	0.10	0.00	0.81	0.40	0.40
P-47	J-23	J-20	-73.29	0.04	0.00	0.47	0.14	0.14
P-48	J-22	J-23	45.45	0.06	0.00	0.29	0.06	0.06
P-49	J-24	J-23	-83.74	0.05	0.00	0.53	0.18	0.18
P-50	J-25	J-27	74.90	0.04	0.00	0.48	0.15	0.15
P-51	J-24	J-25	-16.36	0.01	0.00	0.10	0.01	0.01
P-52	J-26	J-24	-65.10	0.03	0.00	0.42	0.12	0.12
P-53	J-27	J-29	35.73	0.01	0.00	0.23	0.04	0.04
P-54	J-26	J-27	-4.17	0.00	0.00	0.03	0.00	0.00
P-55	J-28	J-26	-34.27	0.01	0.00	0.22	0.04	0.04
P-56	J-29	J-28	0.73	0.00	0.00	0.00	0.00	0.00
P-57	J-30	O-RV-1	-339.00	0.07	0.00	2.16	2.46	2.46
P-58	J-30	J-33	199.37	0.25	0.00	1.27	0.92	0.92
P-59	J-31	J-35	-141.57	0.13	0.00	0.90	0.49	0.49
P-60	J-31	J-36	87.57	0.16	0.00	0.56	0.20	0.20
P-61	J-33	J-32	108.43	0.27	0.00	0.69	0.30	0.30
P-62	J-33	J-35	67.94	0.13	0.00	0.43	0.13	0.13
P-63	J-35	J-34	-97.63	0.07	0.00	0.62	0.25	0.25
P-64	J-34	J-30	-119.63	0.32	0.00	0.76	0.36	0.36
P-65	J-36	J-40	47.57	0.02	0.00	0.30	0.06	0.06
P-66	J-38a	J-1	-394.83	1.28	0.00	1.12	0.45	0.45
P-67	J-3e	I-AV-1	0.00	0.00	0.00	0.00	0.00	0.00
P-68	O-AV-1	J-39	0.00	0.00	0.00	0.00	0.00	0.00

P-69	J-39	T-1	-86.41	0.00	0.00	0.04	0.00	0.00
P-70	J-40	J-32	-90.43	0.16	0.00	0.58	0.21	0.21
P-71	J-40	I-RV-2	119.00	0.05	0.00	0.76	0.35	0.35
P-72	J-38b	J-18	6.45	0.00	0.00	0.04	0.00	0.00
P-73	J-1	T-2	-1068.00	0.02	0.00	0.48	0.03	0.03
P-74	J-37	J-4	-20.00	0.00	0.00	0.13	0.01	0.01
P-75	J-42	J-3	37.15	0.03	0.00	0.24	0.04	0.04
P-76	J-45	J-9	334.17	0.14	0.00	0.95	0.33	0.33
P-77	O-RV-2	J-42	119.00	0.19	0.00	0.76	0.35	0.35
P-78	O-RV-3	J-36	0.00	0.00	0.00	0.00	0.00	0.00
P-79	O-RV-4	J-31	0.00	0.00	0.00	0.00	0.00	0.00
P-80	J-38	J-1	-673.17	0.05	0.00	0.31	0.01	0.01
P-81	J-38	J-41	673.17	0.90	0.00	1.91	1.22	1.22
P-82	J-43	J-45	334.17	0.10	0.00	0.95	0.33	0.33
P-83	J-43	J-41	-673.17	1.08	0.00	1.91	1.22	1.22
P-84	I-RV-1	J-43	-339.00	0.01	0.00	0.96	0.34	0.34
~@AV-1-XX	I-AV-1	O-AV-1						

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
I-AV-1		0.00	2486.93	2065.00	421.93	182.84
J-1		0.00	2486.98	2226.00	260.98	113.09
J-2		0.00	2099.00	1911.00	188.00	81.47
J-3		34.00	2202.62	2033.00	169.62	73.50
J-4		38.00	2202.62	2048.00	154.62	67.00
J-5		11.00	2202.62	2018.00	184.62	80.00
J-6		0.00	2484.68	2276.00	208.68	90.43
J-7		35.00	2484.52	2265.00	219.52	95.13
J-8		18.00	2484.46	2262.00	222.46	96.40
J-9		35.00	2484.71	2258.00	226.71	98.24
J-10		35.00	2484.67	2269.00	215.67	93.46
J-11		35.00	2484.54	2268.00	216.54	93.83

J-12	35.00	2484.54	2270.00	214.54	92.97
J-13	35.00	2484.66	2271.00	213.66	92.59
J-14	35.00	2484.66	2273.00	211.66	91.72
J-15	35.00	2484.54	2272.00	212.54	92.10
J-16	29.00	2484.44	2259.00	225.44	97.69
J-17	12.00	2484.44	2255.00	229.44	99.42
J-18	29.00	2484.44	2258.00	226.44	98.12
J-19	11.00	2484.44	2252.00	232.44	100.72
J-20	35.00	2484.53	2274.00	210.53	91.23
J-21	35.00	2484.67	2275.00	209.67	90.86
J-22	35.00	2484.56	2279.00	205.56	89.08
J-23	35.00	2484.50	2276.00	208.50	90.35
J-24	35.00	2484.45	2278.00	206.45	89.46
J-25	35.00	2484.46	2281.00	203.46	88.17
J-26	35.00	2484.42	2280.00	204.42	88.58
J-27	35.00	2484.42	2283.00	201.42	87.28
J-28	35.00	2484.41	2282.00	202.41	87.71
J-29	35.00	2484.41	2285.00	199.41	86.41
J-30	20.00	2271.39	2192.00	79.39	34.40
J-31	54.00	2270.88	2108.00	162.88	70.58
J-32	18.00	2270.87	2099.00	171.87	74.48
J-33	23.00	2271.14	2166.00	105.14	45.56
J-34	22.00	2271.08	2149.00	122.08	52.90
J-35	24.00	2271.01	2129.00	142.01	61.54
J-36	40.00	2270.73	2109.00	161.73	70.08
J-37	20.00	2202.62	2032.00	170.62	73.94
J-38	0.00	2486.93	2100.00	386.93	167.67
J-39	0.00	2099.00	2052.00	47.00	20.37
J-40	19.00	2270.71	2104.00	166.71	72.24
J-41	0.00	2486.03	2149.00	337.03	146.05
J-42	16.00	2202.65	2065.00	137.65	59.65
J-43	0.00	2484.94	2195.00	289.94	125.64
J-45	0.00	2484.85	2223.00	261.85	113.47
J-38a	0.00	2485.70	2265.00	220.70	95.64
J-38b	0.00	2484.44	2256.00	228.44	98.99
J-3b	0.00	2099.00	1981.00	118.00	51.13
J-3c	0.00	2099.00	2018.00	81.00	35.10
J-3d	0.00	2099.00	2032.00	67.00	29.03

J-3e	0.00	2486.93	2100.00	386.93	167.67
J-3f	18.00	2098.89	1990.00	108.89	47.19
J-3g	0.00	2099.00	1933.00	166.00	71.93
J-3h	42.00	2098.91	1979.00	119.91	51.96
J-3i	19.00	2098.90	1982.00	116.90	50.65
J-3j	29.00	2098.87	1913.00	185.87	80.55
J-3k	22.00	2098.88	1925.00	173.88	75.35
J-3l	54.00	2098.90	1943.00	155.90	67.56
J-3m	13.00	2098.90	1958.00	140.90	61.05
J-3n	11.00	2098.89	1971.00	127.89	55.42
J-3o	11.00	2098.89	1937.00	161.89	70.15
I-RV-1	0.00	2484.93	2193.00	291.93	126.50
I-RV-2	0.00	2270.66	2099.00	171.66	74.39
I-RV-3	0.00	2202.62	2089.00	113.62	49.24
O-RV-4	----	2270.88	2104.00	166.88	72.32
T-1	----	2099.00	2046.70	52.30	22.66
T-2	----	2487.00	2452.70	34.30	14.86
T-1a	----	2099.00	2046.70	52.30	22.66
O-AV-1	0.00	2099.00	2065.00	34.00	14.73
O-RV-1	----	2271.46	2193.00	78.46	34.00
O-RV-2	----	2202.85	2099.00	103.85	45.00
O-RV-3	----	2270.73	2089.00	181.73	78.75
I-RV-4	0.00	2486.93	2104.00	382.93	165.94

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
I-AV-1	182.84	O-AV-1	14.73
J-3e	167.67	T-2	14.86
J-38	167.67	J-39	20.37
I-RV-4	165.94	T-1	22.66
J-41	146.05	T-1a	22.66

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-57	2.16	P-56	0.00
P-81	1.91	P-8	0.01
P-83	1.91	P-54	0.03
P-25	1.32	P-12	0.03
P-58	1.27	P-3	0.04

H L + M L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL+ML/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL+ML/1000 (ft/ft)
P-57	2.46	P-8	0.00
P-81	1.22	P-56	0.00
P-83	1.22	P-3	0.00
P-25	0.99	P-4	0.00
P-58	0.92	P-5	0.00

H L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL/1000 (ft/ft)
P-57	2.46	P-8	0.00
P-81	1.22	P-56	0.00
P-83	1.22	P-3	0.00
P-25	0.99	P-4	0.00
P-58	0.92	P-5	0.00

R E G U L A T I N G V A L V E R E P O R T

VALVE LABEL	VALVE TYPE	VALVE SETTING psi or gpm	VALVE STATUS	UPSTREAM PRESSURE psi	DOWNSTREAM PRESSURE psi	THROUGH FLOW gpm
RV-1	PRV-2	34.00	ACTIVATED	126.50	34.00	339.00
RV-2	PRV-1	45.00	ACTIVATED	74.39	45.00	119.00
RV-3	PRV-1	41.00	CLOSED	49.24	78.75	0.00
RV-4	PRV-1	58.00	CLOSED	165.94	72.32	0.00

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE gpm	NODE TITLE
T-1	86.41	
T-2	1068.00	
T-1a	132.59	

NET SYSTEM INFLOW = 1287.00
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 1287.00

***** HYDRAULIC ANALYSIS COMPLETED *****

5. MDD Operation with Fire Flow @ J-3 Analysis Report

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* * * * * * * * * * * * *  K Y P I P E  * * * * * * * * * * * * *
*                                                                 *
*  Pipe Network Modeling Software                                 *
*                                                                 *
*  CopyRighted by KYPIPE LLC (www.kypipe.com)                     *
*  Version: 10.009  10/01/2019                                    *
*  Serial #:  8-10075658                                          *
*  Interface:  KYnetic                                            *
*  Licensed for Pipe2020                                          *
*                                                                 *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
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Date & Time: Thu Aug 24 17:29:09 2023

Master File : p:\wce_work\2022 wce projects\2022-3185 blue fern- true property\documents\water model\3185 water model fire at j3.KYP\3185 water model fire at j3.P2K

SUMMARY OF ORIGINAL DATA

UNITS SPECIFIED

FLOWRATE ..... = gallons/minute
HEAD (HGL) ..... = feet
PRESSURE ..... = psig

R E G U L A T I N G V A L V E D A T A

VALVE LABEL	VALVE TYPE	VALVE SETTING (ft or gpm)
RV-1	PRV-2	2271.46
RV-2	PRV-1	2202.85
RV-3	PRV-1	2183.62
RV-4	PRV-1	2237.85

P I P E L I N E D A T A

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NAMES #1	#2	LENGTH (ft)	DIAMETER (in)	ROUGHNESS COEFF.	MINOR LOSS COEFF.
P-1	T-1a	J-2	200.00	30.00	130.0000	0.00
P-2	J-2	J-3g	760.00	30.00	130.0000	0.00
P-3	J-3c	J-3b	625.00	30.00	130.0000	0.00
P-4	J-3c	J-3d	420.00	30.00	130.0000	0.00
P-5	J-3d	J-39	780.00	30.00	130.0000	0.00
P-6	J-3e	J-38	46.00	30.00	130.0000	0.00
P-7	J-3b	J-3h	350.00	8.00	130.0000	0.00
P-8	J-3g	J-3b	810.00	30.00	130.0000	0.00
P-9	J-3h	J-3i	250.00	8.00	130.0000	0.00
P-10	J-3i	J-3f	440.00	8.00	130.0000	0.00
P-11	J-3h	J-3l	640.00	8.00	130.0000	0.00
P-12	J-3i	J-3m	475.00	8.00	130.0000	0.00
P-13	J-3k	J-3j	215.00	8.00	130.0000	0.00
P-14	J-3l	J-3k	320.00	8.00	130.0000	0.00
P-15	J-3g	J-3l	275.00	8.00	130.0000	0.00
P-16	J-3m	J-3o	320.00	8.00	130.0000	0.00
P-17	J-3l	J-3m	250.00	8.00	130.0000	0.00
P-18	J-3m	J-3n	180.00	8.00	130.0000	0.00

P-19	J-4	I-RV-3	765.00	8.00	130.0000	0.00
P-20	J-3	J-5	290.00	8.00	130.0000	0.00
P-21	J-4	J-42	250.00	8.00	130.0000	0.00
P-22	J-3	J-4	500.00	8.00	130.0000	0.00
P-23	J-3e	I-RV-4	93.00	8.00	130.0000	0.00
P-24	J-6	J-38a	2245.40	12.00	130.0000	0.00
P-25	J-6	J-22	125.00	8.00	130.0000	0.00
P-26	J-8	J-16	250.00	8.00	130.0000	0.00
P-27	J-7	J-8	250.00	8.00	130.0000	0.00
P-28	J-9	J-10	250.00	12.00	130.0000	0.00
P-29	J-7	J-9	1040.00	8.00	130.0000	0.00
P-30	J-10	J-13	250.00	12.00	130.0000	0.00
P-31	J-11	J-7	250.00	8.00	130.0000	0.00
P-32	J-10	J-11	1040.00	8.00	130.0000	0.00
P-33	J-12	J-11	250.00	8.00	130.0000	0.00
P-34	J-13	J-14	250.00	12.00	130.0000	0.00
P-35	J-12	J-13	1040.00	8.00	130.0000	0.00
P-36	J-14	J-21	250.00	12.00	130.0000	0.00
P-37	J-15	J-12	250.00	8.00	130.0000	0.00
P-38	J-14	J-15	1040.00	8.00	130.0000	0.00
P-39	J-16	J-38b	254.77	8.00	130.0000	0.00
P-40	J-16	J-17	375.00	8.00	130.0000	0.00
P-41	J-18	J-8	530.00	8.00	130.0000	0.00
P-42	J-18	J-19	300.00	8.00	130.0000	0.00
P-43	J-20	J-15	250.00	8.00	130.0000	0.00
P-44	J-21	J-6	125.00	12.00	130.0000	0.00
P-45	J-20	J-21	1040.00	8.00	130.0000	0.00
P-46	J-22	J-25	250.00	8.00	130.0000	0.00
P-47	J-23	J-20	250.00	8.00	130.0000	0.00
P-48	J-22	J-23	1040.00	8.00	130.0000	0.00
P-49	J-24	J-23	250.00	8.00	130.0000	0.00
P-50	J-25	J-27	250.00	8.00	130.0000	0.00
P-51	J-24	J-25	1040.00	8.00	130.0000	0.00
P-52	J-26	J-24	250.00	8.00	130.0000	0.00
P-53	J-27	J-29	250.00	8.00	130.0000	0.00
P-54	J-26	J-27	1040.00	8.00	130.0000	0.00
P-55	J-28	J-26	250.00	8.00	130.0000	0.00
P-56	J-29	J-28	1040.00	8.00	130.0000	0.00

P-57	J-30	O-RV-1	28.00	8.00	130.0000	0.00
P-58	J-30	J-33	270.00	8.00	130.0000	0.00
P-59	J-31	J-35	260.00	8.00	130.0000	0.00
P-60	J-31	J-36	775.00	8.00	130.0000	0.00
P-61	J-33	J-32	920.00	8.00	130.0000	0.00
P-62	J-33	J-35	1055.00	8.00	130.0000	0.00
P-63	J-35	J-34	270.00	8.00	130.0000	0.00
P-64	J-34	J-30	880.00	8.00	130.0000	0.00
P-65	J-36	J-40	280.00	8.00	130.0000	0.00
P-66	J-38a	J-1	2829.60	12.00	130.0000	0.00
P-67	J-3e	I-AV-1	550.00	30.00	130.0000	0.00
P-68	O-AV-1	J-39	150.00	30.00	130.0000	0.00
P-69	J-39	T-1	320.00	30.00	130.0000	0.00
P-70	J-40	J-32	745.00	8.00	130.0000	0.00
P-71	J-40	I-RV-2	143.00	8.00	130.0000	0.00
P-72	J-38b	J-18	915.23	8.00	130.0000	0.00
P-73	J-1	T-2	510.00	30.00	130.0000	0.00
P-74	J-37	J-4	260.00	8.00	130.0000	0.00
P-75	J-42	J-3	750.00	8.00	130.0000	0.00
P-76	J-45	J-9	415.00	12.00	130.0000	0.00
P-77	O-RV-2	J-42	547.00	8.00	130.0000	0.00
P-78	O-RV-3	J-36	305.00	8.00	130.0000	0.00
P-79	O-RV-4	J-31	107.00	8.00	130.0000	0.00
P-80	J-38	J-1	3814.00	30.00	130.0000	0.00
P-81	J-38	J-41	740.00	12.00	130.0000	0.00
P-82	J-43	J-45	288.00	12.00	130.0000	0.00
P-83	J-43	J-41	890.00	12.00	130.0000	0.00
P-84	I-RV-1	J-43	38.00	12.00	130.0000	0.00

N O D E D A T A

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	JUNCTION ELEVATION (ft)	EXTERNAL GRADE (ft)
I-AV-1		0.00	2065.00	
J-1		0.00	2226.00	
J-2		0.00	1911.00	
J-3		1534.00	2033.00	
J-4		38.00	2048.00	
J-5		11.00	2018.00	
J-6		0.00	2276.00	
J-7		35.00	2265.00	
J-8		18.00	2262.00	
J-9		35.00	2258.00	
J-10		35.00	2269.00	
J-11		35.00	2268.00	
J-12		35.00	2270.00	
J-13		35.00	2271.00	
J-14		35.00	2273.00	
J-15		35.00	2272.00	
J-16		29.00	2259.00	
J-17		12.00	2255.00	
J-18		29.00	2258.00	
J-19		11.00	2252.00	
J-20		35.00	2274.00	
J-21		35.00	2275.00	
J-22		35.00	2279.00	
J-23		35.00	2276.00	
J-24		35.00	2278.00	
J-25		35.00	2281.00	
J-26		35.00	2280.00	
J-27		35.00	2283.00	
J-28		35.00	2282.00	
J-29		35.00	2285.00	
J-30		20.00	2192.00	

J-31	54.00	2108.00	
J-32	18.00	2099.00	
J-33	23.00	2166.00	
J-34	22.00	2149.00	
J-35	24.00	2129.00	
J-36	40.00	2109.00	
J-37	20.00	2032.00	
J-38	0.00	2100.00	
J-39	0.00	2052.00	
J-40	19.00	2104.00	
J-41	0.00	2149.00	
J-42	16.00	2065.00	
J-43	0.00	2195.00	
J-45	0.00	2223.00	
J-38a	0.00	2265.00	
J-38b	0.00	2256.00	
J-3b	0.00	1981.00	
J-3c	0.00	2018.00	
J-3d	0.00	2032.00	
J-3e	0.00	2100.00	
J-3f	18.00	1990.00	
J-3g	0.00	1933.00	
J-3h	42.00	1979.00	
J-3i	19.00	1982.00	
J-3j	29.00	1913.00	
J-3k	22.00	1925.00	
J-3l	54.00	1943.00	
J-3m	13.00	1958.00	
J-3n	11.00	1971.00	
J-3o	11.00	1937.00	
I-RV-1	0.00	2193.00	
I-RV-2	0.00	2099.00	
I-RV-3	0.00	2089.00	
O-RV-4	----	2104.00	2237.85
T-1	----	2046.70	2099.00
T-2	----	2452.70	2487.00
T-1a	----	2046.70	2099.00
O-AV-1	0.00	2065.00	

O-RV-1	----	2193.00	2271.46
O-RV-2	----	2099.00	2202.85
O-RV-3	----	2089.00	2183.62
I-RV-4	0.00	2104.00	

O U T P U T O P T I O N D A T A

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT

MAXIMUM AND MINIMUM PRESSURES	=	5
MAXIMUM AND MINIMUM VELOCITIES	=	5
MAXIMUM AND MINIMUM HEAD LOSS/1000	=	5

S Y S T E M C O N F I G U R A T I O N

NUMBER OF PIPES .....(P)	=	84
NUMBER OF END NODES .....(J)	=	65
NUMBER OF PRIMARY LOOPS .....(L)	=	16
NUMBER OF SUPPLY NODES .....(F)	=	4
NUMBER OF SUPPLY ZONES .....(Z)	=	1

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Case: 0

RESULTS OBTAINED AFTER 18 TRIALS: ACCURACY = 0.39218E-04

S I M U L A T I O N D E S C R I P T I O N (L A B E L)

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	T-1a	J-2	132.61	0.00	0.00	0.06	0.00	0.00
P-2	J-2	J-3g	132.61	0.00	0.00	0.06	0.00	0.00
P-3	J-3c	J-3b	86.39	0.00	0.00	0.04	0.00	0.00
P-4	J-3c	J-3d	-86.39	0.00	0.00	0.04	0.00	0.00
P-5	J-3d	J-39	-86.39	0.00	0.00	0.04	0.00	0.00
P-6	J-3e	J-38	0.00	0.00	0.00	0.00	0.00	0.00
P-7	J-3b	J-3h	100.48	0.09	0.00	0.64	0.26	0.26
P-8	J-3g	J-3b	14.08	0.00	0.00	0.01	0.00	0.00
P-9	J-3h	J-3i	41.66	0.01	0.00	0.27	0.05	0.05
P-10	J-3i	J-3f	18.00	0.00	0.00	0.11	0.01	0.01
P-11	J-3h	J-3l	16.82	0.01	0.00	0.11	0.01	0.01
P-12	J-3i	J-3m	4.66	0.00	0.00	0.03	0.00	0.00
P-13	J-3k	J-3j	29.00	0.01	0.00	0.19	0.03	0.03
P-14	J-3l	J-3k	51.00	0.02	0.00	0.33	0.07	0.07
P-15	J-3g	J-3l	118.52	0.10	0.00	0.76	0.35	0.35
P-16	J-3m	J-3o	11.00	0.00	0.00	0.07	0.00	0.00
P-17	J-3l	J-3m	30.34	0.01	0.00	0.19	0.03	0.03
P-18	J-3m	J-3n	11.00	0.00	0.00	0.07	0.00	0.00
P-19	J-4	I-RV-3	0.00	0.00	0.00	0.00	0.00	0.00
P-20	J-3	J-5	11.00	0.00	0.00	0.07	0.00	0.00
P-21	J-4	J-42	-820.63	3.17	0.00	5.24	12.67	12.67
P-22	J-3	J-4	-762.63	5.53	0.00	4.87	11.06	11.06
P-23	J-3e	I-RV-4	0.00	0.00	0.00	0.00	0.00	0.00
P-24	J-6	J-38a	-893.38	4.62	0.00	2.53	2.06	2.06
P-25	J-6	J-22	275.45	0.21	0.00	1.76	1.68	1.68
P-26	J-8	J-16	47.45	0.02	0.00	0.30	0.06	0.06
P-27	J-7	J-8	99.00	0.06	0.00	0.63	0.25	0.25
P-28	J-9	J-10	-239.82	0.05	0.00	0.68	0.18	0.18
P-29	J-7	J-9	-40.44	0.05	0.00	0.26	0.05	0.05
P-30	J-10	J-13	-309.82	0.07	0.00	0.88	0.29	0.29

P-31	J-11	J-7	93.56	0.06	0.00	0.60	0.23	0.23
P-32	J-10	J-11	35.00	0.04	0.00	0.22	0.04	0.04
P-33	J-12	J-11	93.56	0.06	0.00	0.60	0.23	0.23
P-34	J-13	J-14	-386.94	0.11	0.00	1.10	0.44	0.44
P-35	J-12	J-13	-42.12	0.05	0.00	0.27	0.05	0.05
P-36	J-14	J-21	-485.10	0.17	0.00	1.38	0.66	0.66
P-37	J-15	J-12	86.44	0.05	0.00	0.55	0.20	0.20
P-38	J-14	J-15	63.16	0.11	0.00	0.40	0.11	0.11
P-39	J-16	J-38b	6.45	0.00	0.00	0.04	0.00	0.00
P-40	J-16	J-17	12.00	0.00	0.00	0.08	0.01	0.01
P-41	J-18	J-8	-33.55	0.02	0.00	0.21	0.03	0.03
P-42	J-18	J-19	11.00	0.00	0.00	0.07	0.00	0.00
P-43	J-20	J-15	58.28	0.02	0.00	0.37	0.09	0.09
P-44	J-21	J-6	-617.93	0.13	0.00	1.75	1.04	1.04
P-45	J-20	J-21	-97.83	0.26	0.00	0.62	0.25	0.25
P-46	J-22	J-25	160.38	0.15	0.00	1.02	0.62	0.62
P-47	J-23	J-20	-4.55	0.00	0.00	0.03	0.00	0.00
P-48	J-22	J-23	80.07	0.18	0.00	0.51	0.17	0.17
P-49	J-24	J-23	-49.62	0.02	0.00	0.32	0.07	0.07
P-50	J-25	J-27	89.28	0.05	0.00	0.57	0.21	0.21
P-51	J-24	J-25	-36.11	0.04	0.00	0.23	0.04	0.04
P-52	J-26	J-24	-50.72	0.02	0.00	0.32	0.07	0.07
P-53	J-27	J-29	40.59	0.01	0.00	0.26	0.05	0.05
P-54	J-26	J-27	-13.68	0.01	0.00	0.09	0.01	0.01
P-55	J-28	J-26	-29.41	0.01	0.00	0.19	0.03	0.03
P-56	J-29	J-28	5.59	0.00	0.00	0.04	0.00	0.00
P-57	J-30	O-RV-1	-1839.00	1.58	0.00	11.74	56.45	56.45
P-58	J-30	J-33	1177.29	6.67	0.00	7.51	24.72	24.72
P-59	J-31	J-35	-922.53	4.09	0.00	5.89	15.73	15.73
P-60	J-31	J-36	868.53	10.91	0.00	5.54	14.07	14.07
P-61	J-33	J-32	827.47	11.83	0.00	5.28	12.86	12.86
P-62	J-33	J-35	326.83	2.43	0.00	2.09	2.30	2.30
P-63	J-35	J-34	-619.71	2.03	0.00	3.96	7.53	7.53
P-64	J-34	J-30	-641.71	7.07	0.00	4.10	8.03	8.03
P-65	J-36	J-40	828.53	3.61	0.00	5.29	12.89	12.89
P-66	J-38a	J-1	-893.38	5.82	0.00	2.53	2.06	2.06
P-67	J-3e	I-AV-1	0.00	0.00	0.00	0.00	0.00	0.00
P-68	O-AV-1	J-39	0.00	0.00	0.00	0.00	0.00	0.00

P-69	J-39	T-1	-86.39	0.00	0.00	0.04	0.00	0.00
P-70	J-40	J-32	-809.47	9.20	0.00	5.17	12.35	12.35
P-71	J-40	I-RV-2	1619.00	6.38	0.00	10.33	44.59	44.59
P-72	J-38b	J-18	6.45	0.00	0.00	0.04	0.00	0.00
P-73	J-1	T-2	-2568.00	0.09	0.00	1.17	0.17	0.17
P-74	J-37	J-4	-20.00	0.00	0.00	0.13	0.01	0.01
P-75	J-42	J-3	782.37	8.70	0.00	4.99	11.60	11.60
P-76	J-45	J-9	-164.38	0.04	0.00	0.47	0.09	0.09
P-77	O-RV-2	J-42	1619.00	24.39	0.00	10.33	44.59	44.59
P-78	O-RV-3	J-36	0.00	0.00	0.00	0.00	0.00	0.00
P-79	O-RV-4	J-31	0.00	0.00	0.00	0.00	0.00	0.00
P-80	J-38	J-1	-1674.62	0.29	0.00	0.76	0.08	0.08
P-81	J-38	J-41	1674.62	4.88	0.00	4.75	6.59	6.59
P-82	J-43	J-45	-164.38	0.03	0.00	0.47	0.09	0.09
P-83	J-43	J-41	-1674.62	5.86	0.00	4.75	6.59	6.59
P-84	I-RV-1	J-43	-1839.00	0.30	0.00	5.22	7.84	7.84
~@AV-1-XX	I-AV-1	O-AV-1						

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
I-AV-1		0.00	2486.62	2065.00	421.62	182.70
J-1		0.00	2486.91	2226.00	260.91	113.06
J-2		0.00	2099.00	1911.00	188.00	81.47
J-3		1534.00	2169.76	2033.00	136.76	59.26
J-4		38.00	2175.29	2048.00	127.29	55.16
J-5		11.00	2169.76	2018.00	151.76	65.76
J-6		0.00	2476.47	2276.00	200.47	86.87
J-7		35.00	2475.90	2265.00	210.90	91.39
J-8		18.00	2475.83	2262.00	213.83	92.66
J-9		35.00	2475.95	2258.00	217.95	94.44
J-10		35.00	2475.99	2269.00	206.99	89.70
J-11		35.00	2475.95	2268.00	207.95	90.11

J-12	35.00	2476.01	2270.00	206.01	89.27
J-13	35.00	2476.07	2271.00	205.07	88.86
J-14	35.00	2476.17	2273.00	203.17	88.04
J-15	35.00	2476.06	2272.00	204.06	88.43
J-16	29.00	2475.82	2259.00	216.82	93.95
J-17	12.00	2475.82	2255.00	220.82	95.69
J-18	29.00	2475.82	2258.00	217.82	94.39
J-19	11.00	2475.82	2252.00	223.82	96.99
J-20	35.00	2476.08	2274.00	202.08	87.57
J-21	35.00	2476.34	2275.00	201.34	87.25
J-22	35.00	2476.26	2279.00	197.26	85.48
J-23	35.00	2476.08	2276.00	200.08	86.70
J-24	35.00	2476.07	2278.00	198.07	85.83
J-25	35.00	2476.11	2281.00	195.11	84.55
J-26	35.00	2476.05	2280.00	196.05	84.95
J-27	35.00	2476.05	2283.00	193.05	83.66
J-28	35.00	2476.04	2282.00	194.04	84.08
J-29	35.00	2476.04	2285.00	191.04	82.78
J-30	20.00	2269.88	2192.00	77.88	33.75
J-31	54.00	2256.69	2108.00	148.69	64.43
J-32	18.00	2251.37	2099.00	152.37	66.03
J-33	23.00	2263.21	2166.00	97.21	42.12
J-34	22.00	2262.81	2149.00	113.81	49.32
J-35	24.00	2260.78	2129.00	131.78	57.10
J-36	40.00	2245.78	2109.00	136.78	59.27
J-37	20.00	2175.29	2032.00	143.29	62.09
J-38	0.00	2486.62	2100.00	386.62	167.54
J-39	0.00	2099.00	2052.00	47.00	20.37
J-40	19.00	2242.17	2104.00	138.17	59.87
J-41	0.00	2481.75	2149.00	332.75	144.19
J-42	16.00	2178.46	2065.00	113.46	49.16
J-43	0.00	2475.88	2195.00	280.88	121.72
J-45	0.00	2475.91	2223.00	252.91	109.59
J-38a	0.00	2481.09	2265.00	216.09	93.64
J-38b	0.00	2475.82	2256.00	219.82	95.25
J-3b	0.00	2099.00	1981.00	118.00	51.13
J-3c	0.00	2099.00	2018.00	81.00	35.10
J-3d	0.00	2099.00	2032.00	67.00	29.03

J-3e	0.00	2486.62	2100.00	386.62	167.54
J-3f	18.00	2098.89	1990.00	108.89	47.19
J-3g	0.00	2099.00	1933.00	166.00	71.93
J-3h	42.00	2098.91	1979.00	119.91	51.96
J-3i	19.00	2098.90	1982.00	116.90	50.65
J-3j	29.00	2098.87	1913.00	185.87	80.55
J-3k	22.00	2098.88	1925.00	173.88	75.35
J-3l	54.00	2098.90	1943.00	155.90	67.56
J-3m	13.00	2098.90	1958.00	140.90	61.05
J-3n	11.00	2098.89	1971.00	127.89	55.42
J-3o	11.00	2098.89	1937.00	161.89	70.15
I-RV-1	0.00	2475.59	2193.00	282.59	122.45
I-RV-2	0.00	2235.80	2099.00	136.80	59.28
I-RV-3	0.00	2175.29	2089.00	86.29	37.39
O-RV-4	----	2256.69	2104.00	152.69	66.16
T-1	----	2099.00	2046.70	52.30	22.66
T-2	----	2487.00	2452.70	34.30	14.86
T-1a	----	2099.00	2046.70	52.30	22.66
O-AV-1	0.00	2099.00	2065.00	34.00	14.73
O-RV-1	----	2271.46	2193.00	78.46	34.00
O-RV-2	----	2202.85	2099.00	103.85	45.00
O-RV-3	----	2245.78	2089.00	156.78	67.94
I-RV-4	0.00	2486.62	2104.00	382.62	165.80

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
I-AV-1	182.70	O-AV-1	14.73
J-38	167.54	T-2	14.86
J-3e	167.54	J-39	20.37
I-RV-4	165.80	T-1	22.66
J-41	144.19	T-1a	22.66

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-57	11.74	P-8	0.01
P-71	10.33	P-47	0.03
P-77	10.33	P-12	0.03
P-58	7.51	P-56	0.04
P-59	5.89	P-3	0.04

H L + M L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL+ML/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL+ML/1000 (ft/ft)
P-57	56.45	P-8	0.00
P-77	44.59	P-3	0.00
P-71	44.59	P-4	0.00
P-58	24.72	P-5	0.00
P-59	15.73	P-69	0.00

H L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL/1000 (ft/ft)
P-57	56.45	P-8	0.00
P-77	44.59	P-3	0.00
P-71	44.59	P-4	0.00
P-58	24.72	P-5	0.00
P-59	15.73	P-69	0.00

R E G U L A T I N G V A L V E R E P O R T

VALVE LABEL	VALVE TYPE	VALVE SETTING psi or gpm	VALVE STATUS	UPSTREAM PRESSURE psi	DOWNSTREAM PRESSURE psi	THROUGH FLOW gpm
RV-1	PRV-2	34.00	ACTIVATED	122.45	34.00	1839.00
RV-2	PRV-1	45.00	ACTIVATED	59.28	45.00	1619.00
RV-3	PRV-1	41.00	CLOSED	37.39	67.94	0.00
RV-4	PRV-1	58.00	CLOSED	165.80	66.16	0.00

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE gpm	NODE TITLE
T-1	86.39	
T-2	2568.00	
T-1a	132.61	

NET SYSTEM INFLOW = 2787.00
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 2787.00

***** HYDRAULIC ANALYSIS COMPLETED *****

6. MDD Operation with Fire Flow @ J-3f Analysis Report

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* * * * * * * * * * * * * K Y P I P E * * * * * * * * * * * *
*                                                             *
*  Pipe Network Modeling Software                             *
*                                                             *
*  CopyRighted by KYPIPE LLC (www.kypipe.com)                 *
*  Version: 10.009  10/01/2019                                *
*  Serial #:  8-10075658                                      *
*  Interface:  KYnetic                                        *
*  Licensed for Pipe2020                                      *
*                                                             *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
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Date & Time: Thu Aug 24 17:31:46 2023

Master File : p:\wce_work\2022 wce projects\2022-3185 blue fern- true property\documents\water model\3185 water model fire at j3f.KYP\3185 water model fire at j3f.P2K

SUMMARY OF ORIGINAL DATA

UNITS SPECIFIED

FLOWRATE ..... = gallons/minute
HEAD (HGL) ..... = feet
PRESSURE ..... = psig

R E G U L A T I N G V A L V E D A T A

VALVE LABEL	VALVE TYPE	VALVE SETTING (ft or gpm)
RV-1	PRV-2	2271.46
RV-2	PRV-1	2202.85
RV-3	PRV-1	2183.62
RV-4	PRV-1	2237.85

P I P E L I N E D A T A

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NAMES #1	#2	LENGTH (ft)	DIAMETER (in)	ROUGHNESS COEFF.	MINOR LOSS COEFF.
P-1	T-1a	J-2	200.00	30.00	130.0000	0.00
P-2	J-2	J-3g	760.00	30.00	130.0000	0.00
P-3	J-3c	J-3b	625.00	30.00	130.0000	0.00
P-4	J-3c	J-3d	420.00	30.00	130.0000	0.00
P-5	J-3d	J-39	780.00	30.00	130.0000	0.00
P-6	J-3e	J-38	46.00	30.00	130.0000	0.00
P-7	J-3b	J-3h	350.00	8.00	130.0000	0.00
P-8	J-3g	J-3b	810.00	30.00	130.0000	0.00
P-9	J-3h	J-3i	250.00	8.00	130.0000	0.00
P-10	J-3i	J-3f	440.00	8.00	130.0000	0.00
P-11	J-3h	J-3l	640.00	8.00	130.0000	0.00
P-12	J-3i	J-3m	475.00	8.00	130.0000	0.00
P-13	J-3k	J-3j	215.00	8.00	130.0000	0.00
P-14	J-3l	J-3k	320.00	8.00	130.0000	0.00
P-15	J-3g	J-3l	275.00	8.00	130.0000	0.00
P-16	J-3m	J-3o	320.00	8.00	130.0000	0.00
P-17	J-3l	J-3m	250.00	8.00	130.0000	0.00
P-18	J-3m	J-3n	180.00	8.00	130.0000	0.00

P-19	J-4	I-RV-3	765.00	8.00	130.0000	0.00
P-20	J-3	J-5	290.00	8.00	130.0000	0.00
P-21	J-4	J-42	250.00	8.00	130.0000	0.00
P-22	J-3	J-4	500.00	8.00	130.0000	0.00
P-23	J-3e	I-RV-4	93.00	8.00	130.0000	0.00
P-24	J-6	J-38a	2245.40	12.00	130.0000	0.00
P-25	J-6	J-22	125.00	8.00	130.0000	0.00
P-26	J-8	J-16	250.00	8.00	130.0000	0.00
P-27	J-7	J-8	250.00	8.00	130.0000	0.00
P-28	J-9	J-10	250.00	12.00	130.0000	0.00
P-29	J-7	J-9	1040.00	8.00	130.0000	0.00
P-30	J-10	J-13	250.00	12.00	130.0000	0.00
P-31	J-11	J-7	250.00	8.00	130.0000	0.00
P-32	J-10	J-11	1040.00	8.00	130.0000	0.00
P-33	J-12	J-11	250.00	8.00	130.0000	0.00
P-34	J-13	J-14	250.00	12.00	130.0000	0.00
P-35	J-12	J-13	1040.00	8.00	130.0000	0.00
P-36	J-14	J-21	250.00	12.00	130.0000	0.00
P-37	J-15	J-12	250.00	8.00	130.0000	0.00
P-38	J-14	J-15	1040.00	8.00	130.0000	0.00
P-39	J-16	J-38b	254.77	8.00	130.0000	0.00
P-40	J-16	J-17	375.00	8.00	130.0000	0.00
P-41	J-18	J-8	530.00	8.00	130.0000	0.00
P-42	J-18	J-19	300.00	8.00	130.0000	0.00
P-43	J-20	J-15	250.00	8.00	130.0000	0.00
P-44	J-21	J-6	125.00	12.00	130.0000	0.00
P-45	J-20	J-21	1040.00	8.00	130.0000	0.00
P-46	J-22	J-25	250.00	8.00	130.0000	0.00
P-47	J-23	J-20	250.00	8.00	130.0000	0.00
P-48	J-22	J-23	1040.00	8.00	130.0000	0.00
P-49	J-24	J-23	250.00	8.00	130.0000	0.00
P-50	J-25	J-27	250.00	8.00	130.0000	0.00
P-51	J-24	J-25	1040.00	8.00	130.0000	0.00
P-52	J-26	J-24	250.00	8.00	130.0000	0.00
P-53	J-27	J-29	250.00	8.00	130.0000	0.00
P-54	J-26	J-27	1040.00	8.00	130.0000	0.00
P-55	J-28	J-26	250.00	8.00	130.0000	0.00
P-56	J-29	J-28	1040.00	8.00	130.0000	0.00

P-57	J-30	O-RV-1	28.00	8.00	130.0000	0.00
P-58	J-30	J-33	270.00	8.00	130.0000	0.00
P-59	J-31	J-35	260.00	8.00	130.0000	0.00
P-60	J-31	J-36	775.00	8.00	130.0000	0.00
P-61	J-33	J-32	920.00	8.00	130.0000	0.00
P-62	J-33	J-35	1055.00	8.00	130.0000	0.00
P-63	J-35	J-34	270.00	8.00	130.0000	0.00
P-64	J-34	J-30	880.00	8.00	130.0000	0.00
P-65	J-36	J-40	280.00	8.00	130.0000	0.00
P-66	J-38a	J-1	2829.60	12.00	130.0000	0.00
P-67	J-3e	I-AV-1	550.00	30.00	130.0000	0.00
P-68	O-AV-1	J-39	150.00	30.00	130.0000	0.00
P-69	J-39	T-1	320.00	30.00	130.0000	0.00
P-70	J-40	J-32	745.00	8.00	130.0000	0.00
P-71	J-40	I-RV-2	143.00	8.00	130.0000	0.00
P-72	J-38b	J-18	915.23	8.00	130.0000	0.00
P-73	J-1	T-2	510.00	30.00	130.0000	0.00
P-74	J-37	J-4	260.00	8.00	130.0000	0.00
P-75	J-42	J-3	750.00	8.00	130.0000	0.00
P-76	J-45	J-9	415.00	12.00	130.0000	0.00
P-77	O-RV-2	J-42	547.00	8.00	130.0000	0.00
P-78	O-RV-3	J-36	305.00	8.00	130.0000	0.00
P-79	O-RV-4	J-31	107.00	8.00	130.0000	0.00
P-80	J-38	J-1	3814.00	30.00	130.0000	0.00
P-81	J-38	J-41	740.00	12.00	130.0000	0.00
P-82	J-43	J-45	288.00	12.00	130.0000	0.00
P-83	J-43	J-41	890.00	12.00	130.0000	0.00
P-84	I-RV-1	J-43	38.00	12.00	130.0000	0.00

N O D E D A T A

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	JUNCTION ELEVATION (ft)	EXTERNAL GRADE (ft)
I-AV-1		0.00	2065.00	
J-1		0.00	2226.00	
J-2		0.00	1911.00	
J-3		34.00	2033.00	
J-4		38.00	2048.00	
J-5		11.00	2018.00	
J-6		0.00	2276.00	
J-7		35.00	2265.00	
J-8		18.00	2262.00	
J-9		35.00	2258.00	
J-10		35.00	2269.00	
J-11		35.00	2268.00	
J-12		35.00	2270.00	
J-13		35.00	2271.00	
J-14		35.00	2273.00	
J-15		35.00	2272.00	
J-16		29.00	2259.00	
J-17		12.00	2255.00	
J-18		29.00	2258.00	
J-19		11.00	2252.00	
J-20		35.00	2274.00	
J-21		35.00	2275.00	
J-22		35.00	2279.00	
J-23		35.00	2276.00	
J-24		35.00	2278.00	
J-25		35.00	2281.00	
J-26		35.00	2280.00	
J-27		35.00	2283.00	
J-28		35.00	2282.00	
J-29		35.00	2285.00	
J-30		20.00	2192.00	

J-31	54.00	2108.00	
J-32	18.00	2099.00	
J-33	23.00	2166.00	
J-34	22.00	2149.00	
J-35	24.00	2129.00	
J-36	40.00	2109.00	
J-37	20.00	2032.00	
J-38	0.00	2100.00	
J-39	0.00	2052.00	
J-40	19.00	2104.00	
J-41	0.00	2149.00	
J-42	16.00	2065.00	
J-43	0.00	2195.00	
J-45	0.00	2223.00	
J-38a	0.00	2265.00	
J-38b	0.00	2256.00	
J-3b	0.00	1981.00	
J-3c	0.00	2018.00	
J-3d	0.00	2032.00	
J-3e	0.00	2100.00	
J-3f	1518.00	1990.00	
J-3g	0.00	1933.00	
J-3h	42.00	1979.00	
J-3i	19.00	1982.00	
J-3j	29.00	1913.00	
J-3k	22.00	1925.00	
J-3l	54.00	1943.00	
J-3m	13.00	1958.00	
J-3n	11.00	1971.00	
J-3o	11.00	1937.00	
I-RV-1	0.00	2193.00	
I-RV-2	0.00	2099.00	
I-RV-3	0.00	2089.00	
O-RV-4	----	2104.00	2237.85
T-1	----	2046.70	2099.00
T-2	----	2452.70	2487.00
T-1a	----	2046.70	2099.00
O-AV-1	0.00	2065.00	

O-RV-1	----	2193.00	2271.46
O-RV-2	----	2099.00	2202.85
O-RV-3	----	2089.00	2183.62
I-RV-4	0.00	2104.00	

O U T P U T O P T I O N D A T A

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT

MAXIMUM AND MINIMUM PRESSURES	=	5
MAXIMUM AND MINIMUM VELOCITIES	=	5
MAXIMUM AND MINIMUM HEAD LOSS/1000	=	5

S Y S T E M C O N F I G U R A T I O N

NUMBER OF PIPES .....(P)	=	84
NUMBER OF END NODES .....(J)	=	65
NUMBER OF PRIMARY LOOPS .....(L)	=	16
NUMBER OF SUPPLY NODES .....(F)	=	4
NUMBER OF SUPPLY ZONES .....(Z)	=	1

==========

Case: 0

RESULTS OBTAINED AFTER 17 TRIALS: ACCURACY = 0.37435E-04

S I M U L A T I O N D E S C R I P T I O N (L A B E L)

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	T-1a	J-2	1038.07	0.01	0.00	0.47	0.03	0.03
P-2	J-2	J-3g	1038.07	0.02	0.00	0.47	0.03	0.03
P-3	J-3c	J-3b	680.93	0.01	0.00	0.31	0.01	0.01
P-4	J-3c	J-3d	-680.93	0.01	0.00	0.31	0.01	0.01
P-5	J-3d	J-39	-680.93	0.01	0.00	0.31	0.01	0.01
P-6	J-3e	J-38	0.00	0.00	0.00	0.00	0.00	0.00
P-7	J-3b	J-3h	830.46	4.53	0.00	5.30	12.95	12.95
P-8	J-3g	J-3b	149.53	0.00	0.00	0.07	0.00	0.00
P-9	J-3h	J-3i	970.20	4.32	0.00	6.19	17.27	17.27
P-10	J-3i	J-3f	1518.00	17.41	0.00	9.69	39.57	39.57
P-11	J-3h	J-3l	-181.74	0.50	0.00	1.16	0.78	0.78
P-12	J-3i	J-3m	-566.80	3.03	0.00	3.62	6.38	6.38
P-13	J-3k	J-3j	29.00	0.01	0.00	0.19	0.03	0.03
P-14	J-3l	J-3k	51.00	0.02	0.00	0.33	0.07	0.07
P-15	J-3g	J-3l	888.54	4.04	0.00	5.67	14.68	14.68
P-16	J-3m	J-3o	11.00	0.00	0.00	0.07	0.00	0.00
P-17	J-3l	J-3m	601.80	1.78	0.00	3.84	7.13	7.13
P-18	J-3m	J-3n	11.00	0.00	0.00	0.07	0.00	0.00
P-19	J-4	I-RV-3	0.00	0.00	0.00	0.00	0.00	0.00
P-20	J-3	J-5	11.00	0.00	0.00	0.07	0.00	0.00
P-21	J-4	J-42	-65.85	0.03	0.00	0.42	0.12	0.12
P-22	J-3	J-4	-7.85	0.00	0.00	0.05	0.00	0.00
P-23	J-3e	I-RV-4	0.00	0.00	0.00	0.00	0.00	0.00
P-24	J-6	J-38a	-394.83	1.02	0.00	1.12	0.45	0.45
P-25	J-6	J-22	206.71	0.12	0.00	1.32	0.99	0.99
P-26	J-8	J-16	47.45	0.02	0.00	0.30	0.06	0.06
P-27	J-7	J-8	99.00	0.06	0.00	0.63	0.25	0.25
P-28	J-9	J-10	216.76	0.04	0.00	0.61	0.15	0.15
P-29	J-7	J-9	-82.41	0.19	0.00	0.53	0.18	0.18
P-30	J-10	J-13	113.84	0.01	0.00	0.32	0.05	0.05

P-31	J-11	J-7	51.59	0.02	0.00	0.33	0.08	0.08
P-32	J-10	J-11	67.92	0.13	0.00	0.43	0.13	0.13
P-33	J-12	J-11	18.67	0.00	0.00	0.12	0.01	0.01
P-34	J-13	J-14	15.01	0.00	0.00	0.04	0.00	0.00
P-35	J-12	J-13	-63.83	0.12	0.00	0.41	0.11	0.11
P-36	J-14	J-21	-84.01	0.01	0.00	0.24	0.03	0.03
P-37	J-15	J-12	-10.16	0.00	0.00	0.06	0.00	0.00
P-38	J-14	J-15	64.02	0.12	0.00	0.41	0.11	0.11
P-39	J-16	J-38b	6.45	0.00	0.00	0.04	0.00	0.00
P-40	J-16	J-17	12.00	0.00	0.00	0.08	0.01	0.01
P-41	J-18	J-8	-33.55	0.02	0.00	0.21	0.03	0.03
P-42	J-18	J-19	11.00	0.00	0.00	0.07	0.00	0.00
P-43	J-20	J-15	-39.18	0.01	0.00	0.25	0.05	0.05
P-44	J-21	J-6	-188.12	0.01	0.00	0.53	0.11	0.11
P-45	J-20	J-21	-69.11	0.13	0.00	0.44	0.13	0.13
P-46	J-22	J-25	126.26	0.10	0.00	0.81	0.40	0.40
P-47	J-23	J-20	-73.29	0.04	0.00	0.47	0.14	0.14
P-48	J-22	J-23	45.45	0.06	0.00	0.29	0.06	0.06
P-49	J-24	J-23	-83.74	0.05	0.00	0.53	0.18	0.18
P-50	J-25	J-27	74.90	0.04	0.00	0.48	0.15	0.15
P-51	J-24	J-25	-16.36	0.01	0.00	0.10	0.01	0.01
P-52	J-26	J-24	-65.10	0.03	0.00	0.42	0.12	0.12
P-53	J-27	J-29	35.73	0.01	0.00	0.23	0.04	0.04
P-54	J-26	J-27	-4.17	0.00	0.00	0.03	0.00	0.00
P-55	J-28	J-26	-34.27	0.01	0.00	0.22	0.04	0.04
P-56	J-29	J-28	0.73	0.00	0.00	0.00	0.00	0.00
P-57	J-30	O-RV-1	-339.00	0.07	0.00	2.16	2.46	2.46
P-58	J-30	J-33	199.37	0.25	0.00	1.27	0.92	0.92
P-59	J-31	J-35	-141.57	0.13	0.00	0.90	0.49	0.49
P-60	J-31	J-36	87.57	0.16	0.00	0.56	0.20	0.20
P-61	J-33	J-32	108.43	0.27	0.00	0.69	0.30	0.30
P-62	J-33	J-35	67.94	0.13	0.00	0.43	0.13	0.13
P-63	J-35	J-34	-97.63	0.07	0.00	0.62	0.25	0.25
P-64	J-34	J-30	-119.63	0.32	0.00	0.76	0.36	0.36
P-65	J-36	J-40	47.57	0.02	0.00	0.30	0.06	0.06
P-66	J-38a	J-1	-394.83	1.28	0.00	1.12	0.45	0.45
P-67	J-3e	I-AV-1	0.00	0.00	0.00	0.00	0.00	0.00
P-68	O-AV-1	J-39	0.00	0.00	0.00	0.00	0.00	0.00

P-69	J-39	T-1	-680.93	0.00	0.00	0.31	0.01	0.01
P-70	J-40	J-32	-90.43	0.16	0.00	0.58	0.21	0.21
P-71	J-40	I-RV-2	119.00	0.05	0.00	0.76	0.35	0.35
P-72	J-38b	J-18	6.45	0.00	0.00	0.04	0.00	0.00
P-73	J-1	T-2	-1068.00	0.02	0.00	0.48	0.03	0.03
P-74	J-37	J-4	-20.00	0.00	0.00	0.13	0.01	0.01
P-75	J-42	J-3	37.15	0.03	0.00	0.24	0.04	0.04
P-76	J-45	J-9	334.17	0.14	0.00	0.95	0.33	0.33
P-77	O-RV-2	J-42	119.00	0.19	0.00	0.76	0.35	0.35
P-78	O-RV-3	J-36	0.00	0.00	0.00	0.00	0.00	0.00
P-79	O-RV-4	J-31	0.00	0.00	0.00	0.00	0.00	0.00
P-80	J-38	J-1	-673.17	0.05	0.00	0.31	0.01	0.01
P-81	J-38	J-41	673.17	0.90	0.00	1.91	1.22	1.22
P-82	J-43	J-45	334.17	0.10	0.00	0.95	0.33	0.33
P-83	J-43	J-41	-673.17	1.08	0.00	1.91	1.22	1.22
P-84	I-RV-1	J-43	-339.00	0.01	0.00	0.96	0.34	0.34
~@AV-1-XX	I-AV-1	O-AV-1						

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
I-AV-1		0.00	2486.93	2065.00	421.93	182.84
J-1		0.00	2486.98	2226.00	260.98	113.09
J-2		0.00	2098.99	1911.00	187.99	81.46
J-3		34.00	2202.62	2033.00	169.62	73.50
J-4		38.00	2202.62	2048.00	154.62	67.00
J-5		11.00	2202.62	2018.00	184.62	80.00
J-6		0.00	2484.68	2276.00	208.68	90.43
J-7		35.00	2484.52	2265.00	219.52	95.13
J-8		18.00	2484.46	2262.00	222.46	96.40
J-9		35.00	2484.71	2258.00	226.71	98.24
J-10		35.00	2484.67	2269.00	215.67	93.46
J-11		35.00	2484.54	2268.00	216.54	93.83

J-12	35.00	2484.54	2270.00	214.54	92.97
J-13	35.00	2484.66	2271.00	213.66	92.59
J-14	35.00	2484.66	2273.00	211.66	91.72
J-15	35.00	2484.54	2272.00	212.54	92.10
J-16	29.00	2484.44	2259.00	225.44	97.69
J-17	12.00	2484.44	2255.00	229.44	99.42
J-18	29.00	2484.44	2258.00	226.44	98.12
J-19	11.00	2484.44	2252.00	232.44	100.72
J-20	35.00	2484.53	2274.00	210.53	91.23
J-21	35.00	2484.67	2275.00	209.67	90.86
J-22	35.00	2484.56	2279.00	205.56	89.08
J-23	35.00	2484.50	2276.00	208.50	90.35
J-24	35.00	2484.45	2278.00	206.45	89.46
J-25	35.00	2484.46	2281.00	203.46	88.17
J-26	35.00	2484.42	2280.00	204.42	88.58
J-27	35.00	2484.42	2283.00	201.42	87.28
J-28	35.00	2484.41	2282.00	202.41	87.71
J-29	35.00	2484.41	2285.00	199.41	86.41
J-30	20.00	2271.39	2192.00	79.39	34.40
J-31	54.00	2270.88	2108.00	162.88	70.58
J-32	18.00	2270.87	2099.00	171.87	74.48
J-33	23.00	2271.14	2166.00	105.14	45.56
J-34	22.00	2271.08	2149.00	122.08	52.90
J-35	24.00	2271.01	2129.00	142.01	61.54
J-36	40.00	2270.73	2109.00	161.73	70.08
J-37	20.00	2202.62	2032.00	170.62	73.94
J-38	0.00	2486.93	2100.00	386.93	167.67
J-39	0.00	2099.00	2052.00	47.00	20.36
J-40	19.00	2270.71	2104.00	166.71	72.24
J-41	0.00	2486.03	2149.00	337.03	146.05
J-42	16.00	2202.65	2065.00	137.65	59.65
J-43	0.00	2484.94	2195.00	289.94	125.64
J-45	0.00	2484.85	2223.00	261.85	113.47
J-38a	0.00	2485.70	2265.00	220.70	95.64
J-38b	0.00	2484.44	2256.00	228.44	98.99
J-3b	0.00	2098.97	1981.00	117.97	51.12
J-3c	0.00	2098.98	2018.00	80.98	35.09
J-3d	0.00	2098.98	2032.00	66.98	29.03

J-3e	0.00	2486.93	2100.00	386.93	167.67
J-3f	1518.00	2072.71	1990.00	82.71	35.84
J-3g	0.00	2098.97	1933.00	165.97	71.92
J-3h	42.00	2094.44	1979.00	115.44	50.02
J-3i	19.00	2090.12	1982.00	108.12	46.85
J-3j	29.00	2094.90	1913.00	181.90	78.83
J-3k	22.00	2094.91	1925.00	169.91	73.63
J-3l	54.00	2094.93	1943.00	151.93	65.84
J-3m	13.00	2093.15	1958.00	135.15	58.57
J-3n	11.00	2093.15	1971.00	122.15	52.93
J-3o	11.00	2093.15	1937.00	156.15	67.66
I-RV-1	0.00	2484.93	2193.00	291.93	126.50
I-RV-2	0.00	2270.66	2099.00	171.66	74.39
I-RV-3	0.00	2202.62	2089.00	113.62	49.24
O-RV-4	----	2270.88	2104.00	166.88	72.32
T-1	----	2099.00	2046.70	52.30	22.66
T-2	----	2487.00	2452.70	34.30	14.86
T-1a	----	2099.00	2046.70	52.30	22.66
O-AV-1	0.00	2099.00	2065.00	34.00	14.73
O-RV-1	----	2271.46	2193.00	78.46	34.00
O-RV-2	----	2202.85	2099.00	103.85	45.00
O-RV-3	----	2270.73	2089.00	181.73	78.75
I-RV-4	0.00	2486.93	2104.00	382.93	165.94

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
I-AV-1	182.84	O-AV-1	14.73
J-3e	167.67	T-2	14.86
J-38	167.67	J-39	20.36
I-RV-4	165.94	T-1	22.66
J-41	146.05	T-1a	22.66

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-10	9.69	P-56	0.00
P-9	6.19	P-54	0.03
P-15	5.67	P-39	0.04
P-7	5.30	P-72	0.04
P-17	3.84	P-34	0.04

H L + M L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL+ML/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL+ML/1000 (ft/ft)
P-10	39.57	P-56	0.00
P-9	17.27	P-54	0.00
P-15	14.68	P-8	0.00
P-7	12.95	P-34	0.00
P-17	7.13	P-39	0.00

H L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL/1000 (ft/ft)
P-10	39.57	P-56	0.00
P-9	17.27	P-54	0.00
P-15	14.68	P-8	0.00
P-7	12.95	P-34	0.00
P-17	7.13	P-39	0.00

R E G U L A T I N G V A L V E R E P O R T

VALVE LABEL	VALVE TYPE	VALVE SETTING psi or gpm	VALVE STATUS	UPSTREAM PRESSURE psi	DOWNSTREAM PRESSURE psi	THROUGH FLOW gpm
RV-1	PRV-2	34.00	ACTIVATED	126.50	34.00	339.00
RV-2	PRV-1	45.00	ACTIVATED	74.39	45.00	119.00
RV-3	PRV-1	41.00	CLOSED	49.24	78.75	0.00
RV-4	PRV-1	58.00	CLOSED	165.94	72.32	0.00

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

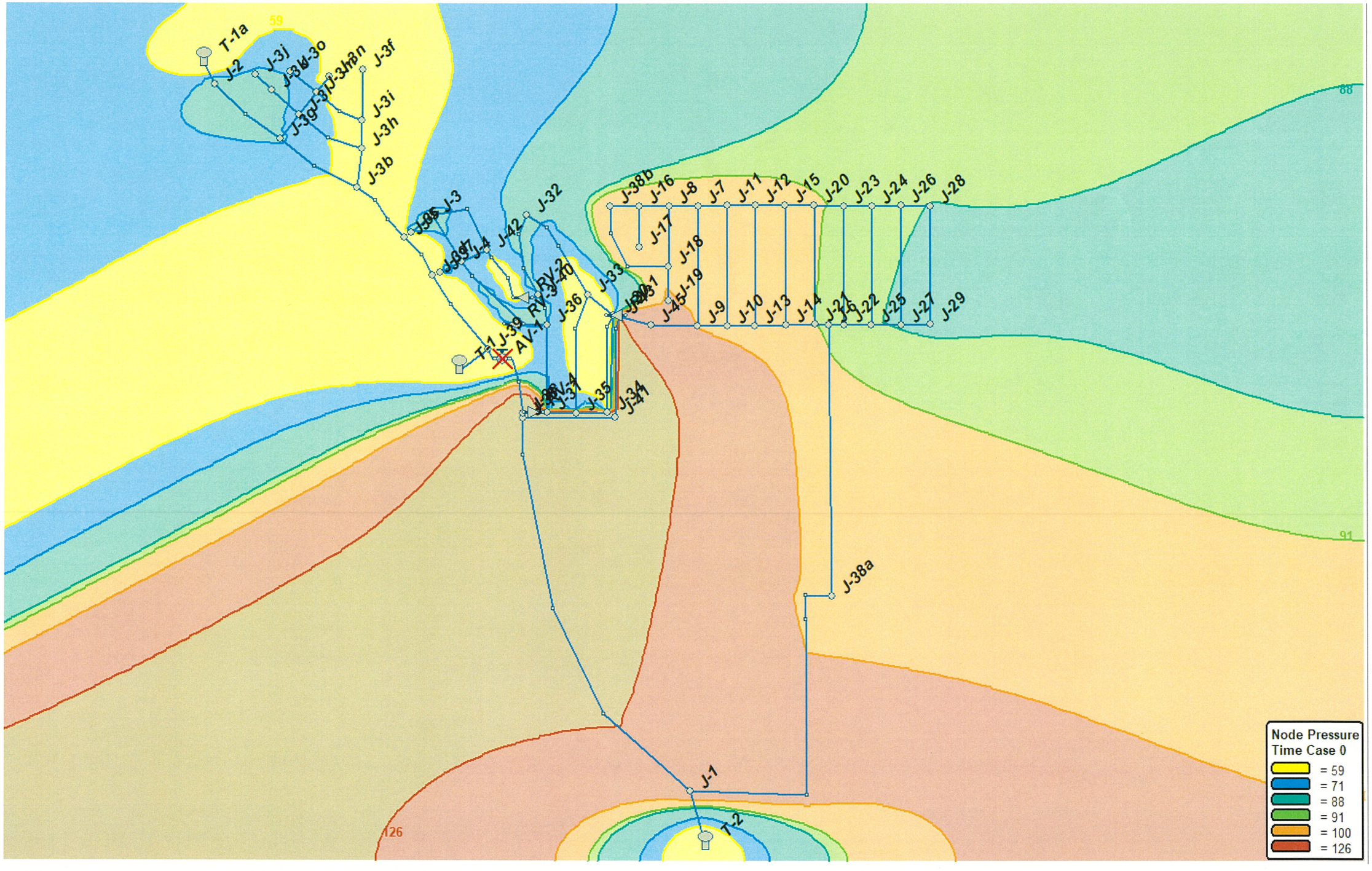
(+) INFLOWS INTO THE SYSTEM FROM SUPPLY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO SUPPLY NODES

NODE NAME	FLOWRATE gpm	NODE TITLE
T-1	680.93	
T-2	1068.00	
T-1a	1038.07	

NET SYSTEM INFLOW = 2787.00
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 2787.00

***** HYDRAULIC ANALYSIS COMPLETED *****

7. Pressure Contour Map Exhibit for MDD with no Fire Flow scenario


T-1a
59
J-2
J-3j
J-3k
J-3o
J-3n
J-3f
J-3g
J-3i
J-3h
J-3b
J-3
J-32
J-42
J-4
J-40
J-33
RV-2
RV-3
J-36
J-39
AV-1
T-1
J-37
J-35
J-34
J-41
J-38b
J-16
J-8
J-7
J-11
J-12
J-15
J-20
J-23
J-24
J-26
J-28
J-17
J-18
J-19
J-45
J-9
J-10
J-13
J-14
J-21
J-22
J-25
J-27
J-29
88
91
J-38a
J-1
T-2
126
Node Pressure
Time Case 0
= 59
= 71
= 88
= 91
= 100
= 126

8. Water Zones Map

SW¼, SEC.25, T.25N., R.42E., W.M.
NE¼, SEC.35, T.25N., R.42E., W.M.
SE¼, SEC.35, T.25N., R.42E., W.M.

UNDERGROUND SERVICE ALERT
ONE-CALL NUMBER
811
CALL TWO BUSINESS DAYS BEFORE YOU DIG

LOW ZONE

PRV MID ZONE

HIGH ZONE

EXISTING 30" WATER TRANSMISSION LINE TO TANK

EXISTING WATER TANK

EXISTING 30" WATER TRANSMISSION LINE FROM TANK

NAVD - 88
XXX

N
W E
S

GRAPHIC SCALE
200 0 100 200 400
(IN FEET)
1 inch = 200 ft.

NO	DATE	BY	REVISIONS

SCALE:	
HORIZONTAL:	1"=200'
VERTICAL:	N/A

PROJ #:	22-3185
DATE:	01/18/23
DRAWN:	SLS
REVIEWED:	TRW

	CIVIL
	STRUCTURAL
	SURVEYING
	TRAFFIC
X	PLANNING
	LANDSCAPE
	OTHER

WCE
WHIPPLE CONSULTING ENGINEERS
21 S. PINES ROAD
SPOKANE VALLEY, WA 99206
PH: 509-893-2617 FAX: 509-926-0227

VICTORY HEIGHTS
WATER SERVICE PLAN
2929 W THORPE RD
SPOKANE, WA

TODD R. WHIPPLE
STATE OF WASHINGTON
25462
REGISTERED
PROFESSIONAL ENGINEER

SHEET
1 OF 1

JOB NUMBER
22-3185

P:\WCE_WORK\2022 WCE PROJECTS\2022-3185 Blue Fern- True Property\DWG\3185-TH LAYOUT.dwg, 8/18/2023 11:14:12 AM, randrade, DWG To PDF.pc3